

AD-A086 375 NAVAL POLAR OCEANOGRAPHY CENTER WASHINGTON DC
EASTERN-WESTERN ARCTIC SEA ICE ANALYSIS.(U)
1979

NAVAL POLAR OCEANOGRAPHY CENTER WASHINGTON DC
EASTERN-WESTERN ARCTIC SEA ICE ANALYSIS. (U)
1979

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ARCTIC SEA ICE ANALYSIS.

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FOREWORD

The U. S. Navy has a long and colorful history of polar exploration and currently is an active participant in the growing national activity in the Arctic and Antarctic. The strategic importance and increased demand for the natural resources of these areas have resulted in a greater requirement for environmental information. In 1976, the National Oceanic and Atmospheric Administration (NOAA) joined the Navy in forming a Joint Ice Center (JIC) to combine efforts and resources in sea ice analysis and forecasting.

Until a few years ago, reliable sea ice information in the polar regions was based on a relatively few shore station and ship reports augmented by limited aerial reconnaissance data. These data were further restricted mainly to the relatively small areas observed primarily during the ship operating seasons. The advent of high resolution satellite imagery combined with the ground truth of conventional observations has in recent years enabled a description of the polar ice fields on a semi-synoptic scale in both polar regions.

This publication is the sixth in a continuing yearly series of Arctic sea ice atlases prepared in the Joint Ice Center at the Naval Polar Oceanography Center, Suitland. The atlas contains weekly charts depicting Northern Hemisphere and Great Lakes ice conditions and extents. The information presented was prepared under operational time constraints principally from

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FOREWORD

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satellite imagery supplemented by conventional observations. The Great Lakes ice analyses are derived principally from information provided by the National Weather Service Forecast Office, Ann Arbor, Michigan. Table I located on the inside back cover summarizes satellite data availability for 1979.

The purpose of this atlas is to provide operators and researchers with reliable weekly hemispheric ice analyses. Satellite data limitations and other difficulties involved in manually synthesizing various forms of ice data have evolved the following analysis procedures:

(a) Conventional shore station, ship, and aerial ice reconnaissance observations are plotted on base charts and evaluated for timeliness.

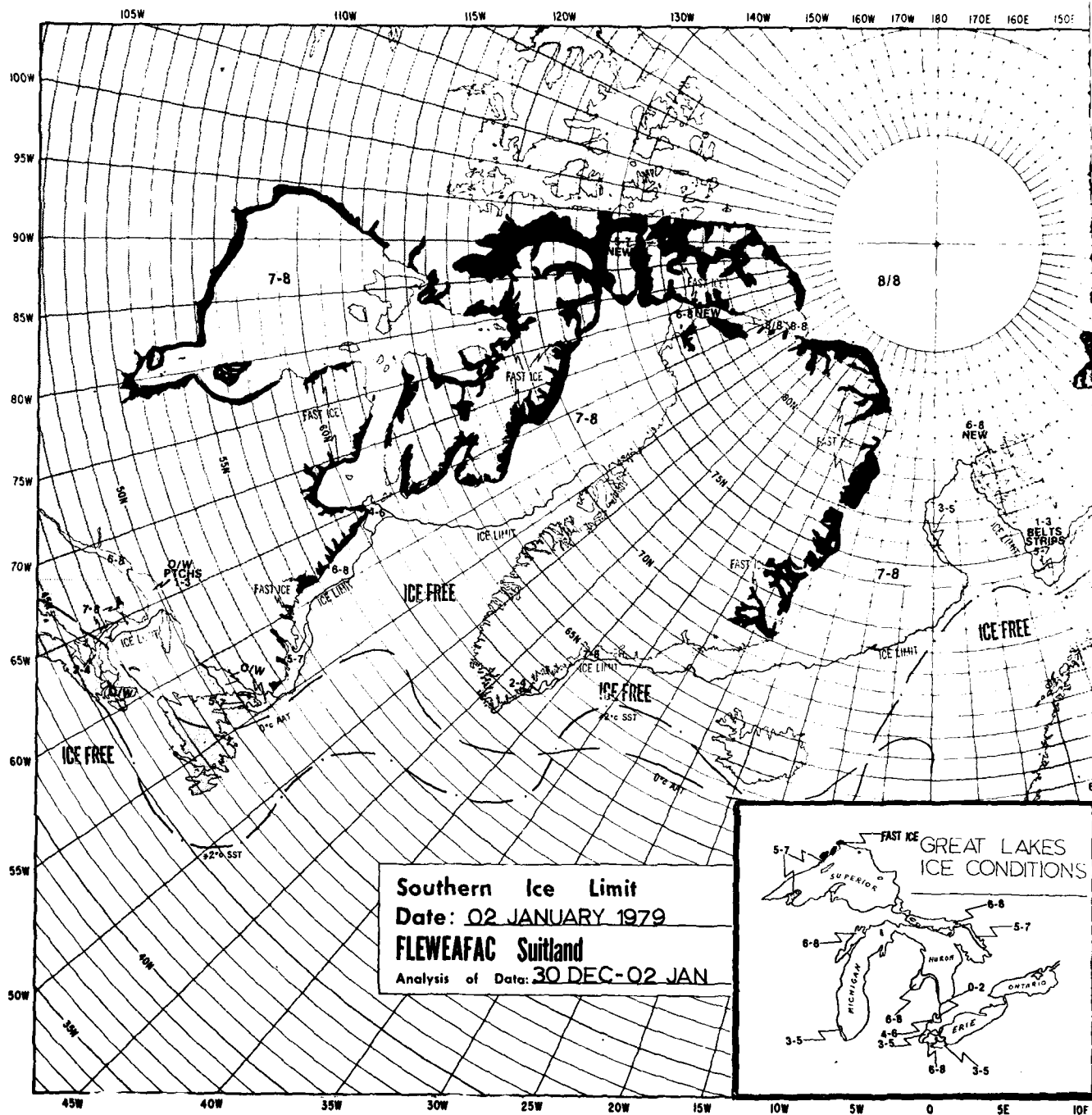
(b) Satellite data is analyzed for ice information content, with the most recent and highest resolution considered first. Synthesis of conventional with satellite data yields the final analysis, AND

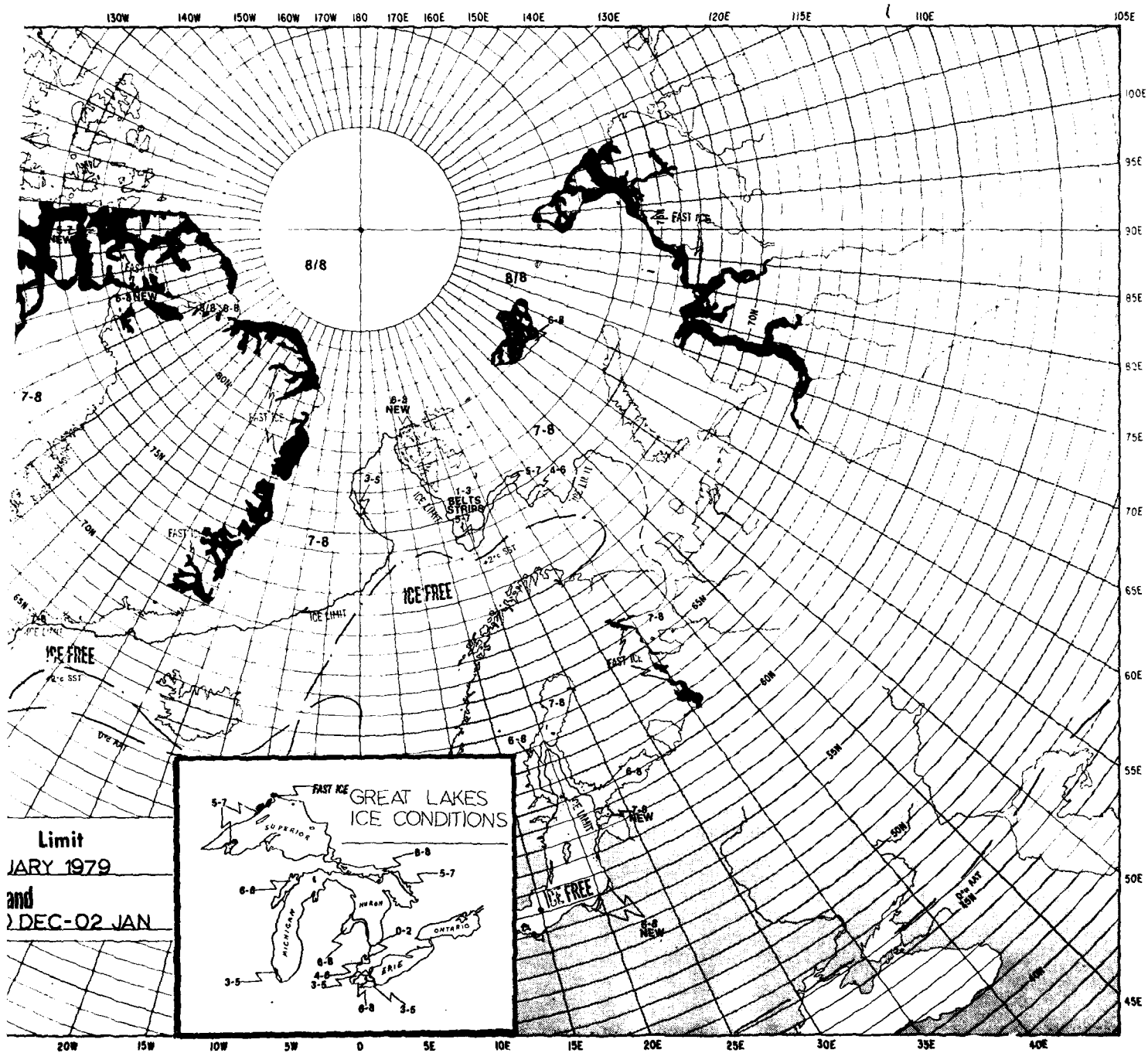
(c) Where sufficient data is not available to define the sea ice limit, an estimated ice boundary is depicted. After one week of no data availability the ice edge position is based on analyzed theoretical ice drift data and other diagnostic aids. During subsequent weeks of no data availability the ice edges approach seasonal mean positions.

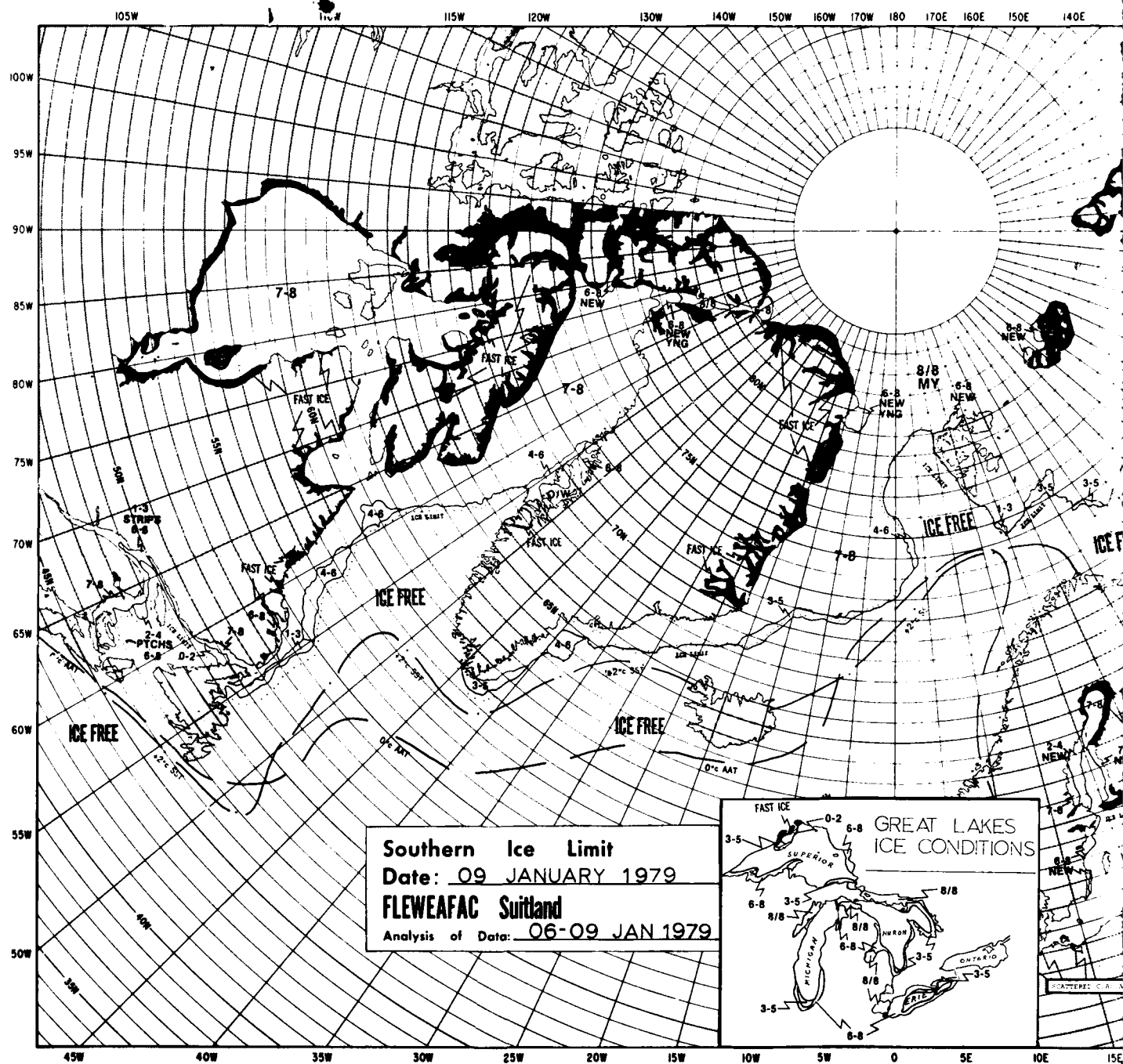
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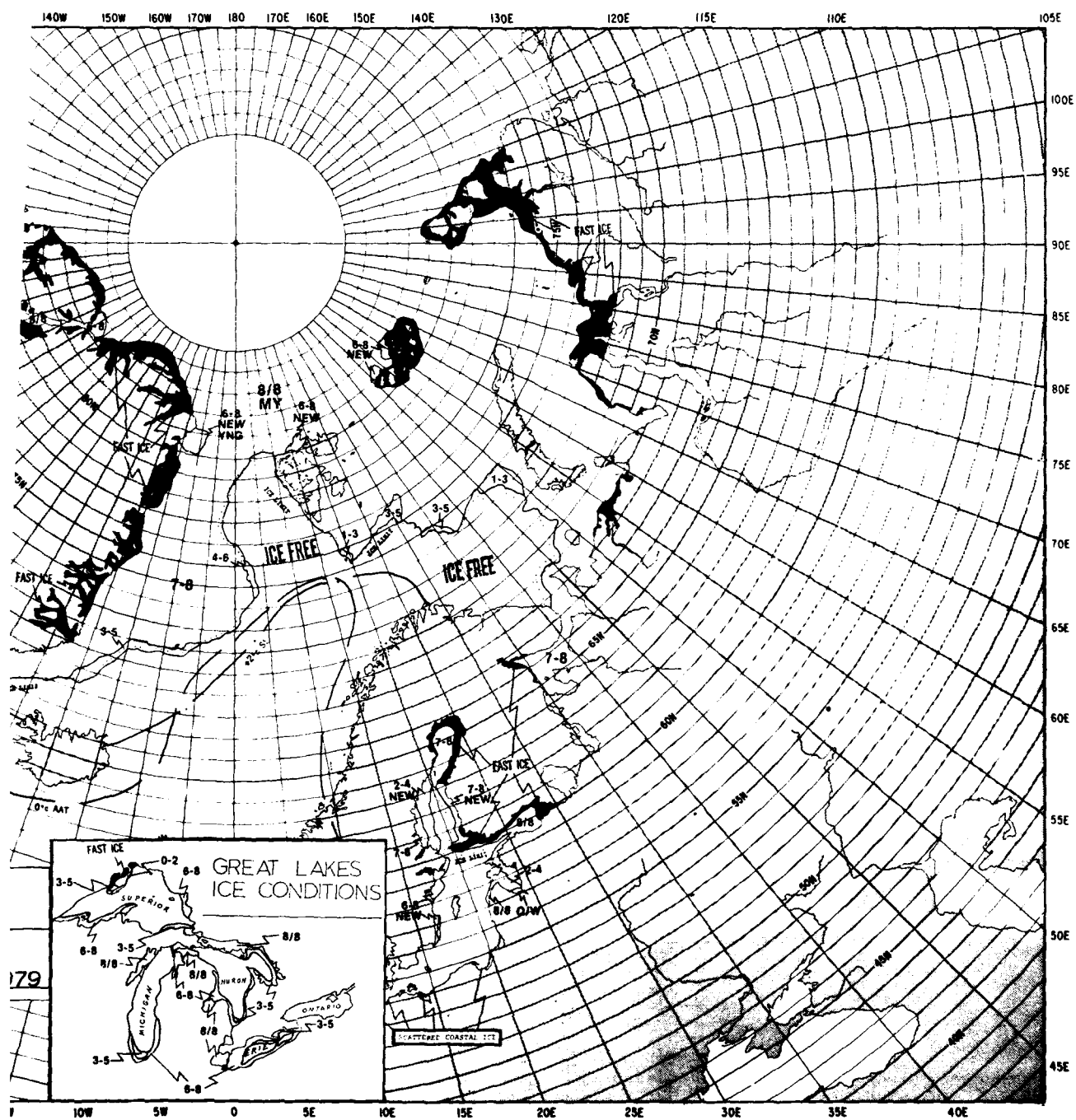
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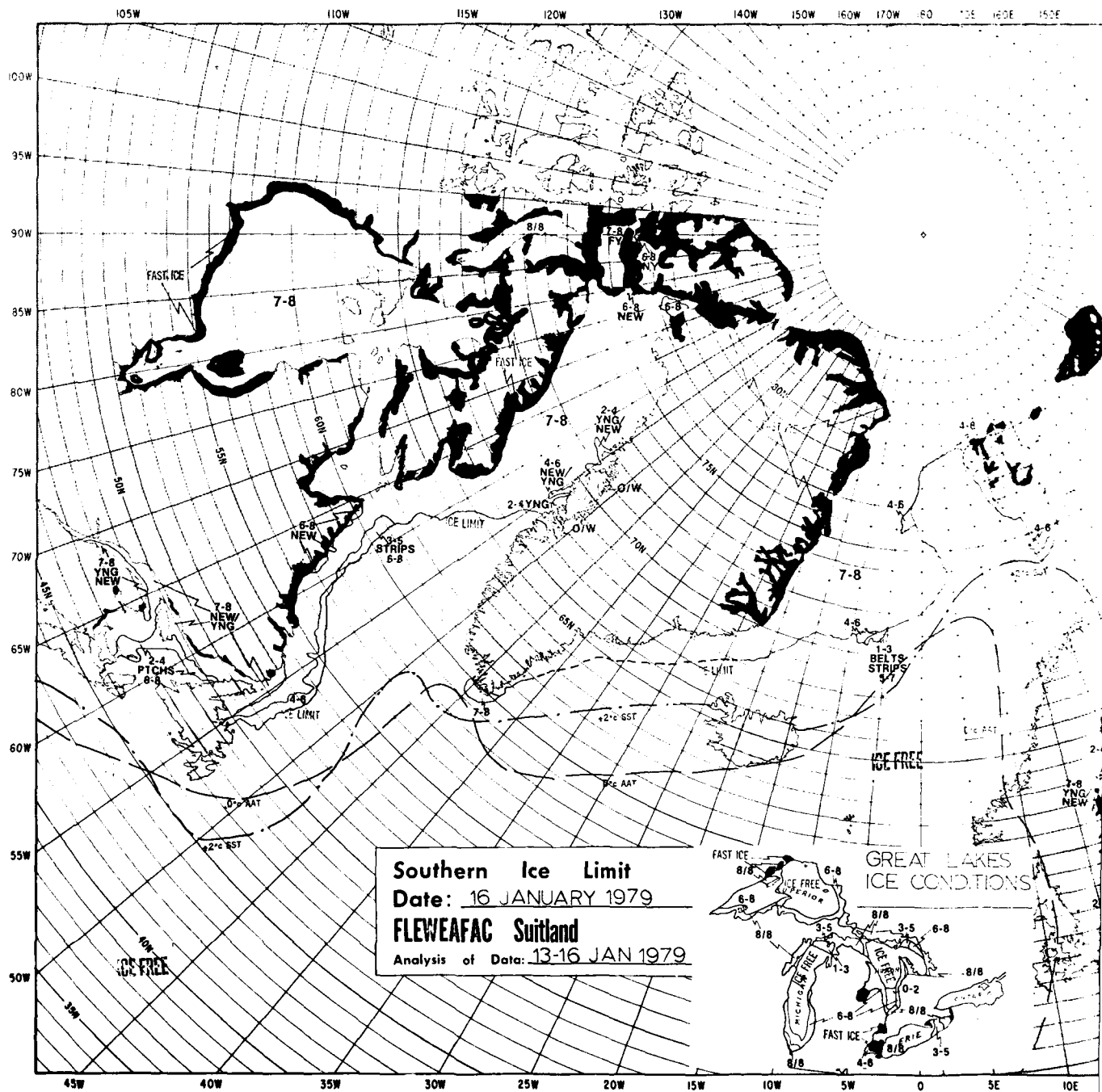
Naval Polar Oceanography Center
Navy Department
4301 Suitland Rd.,
Washington, DC 20390

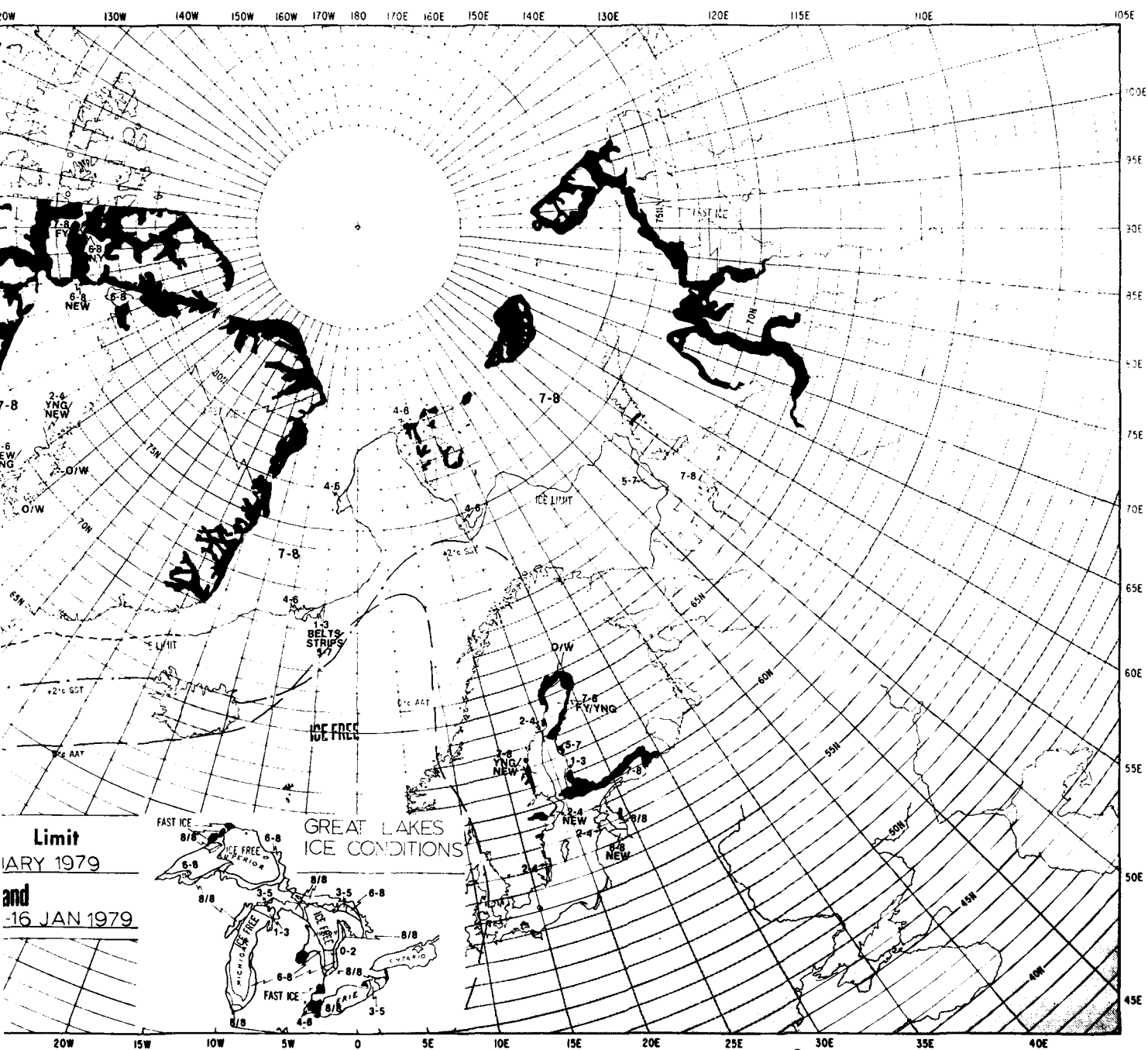


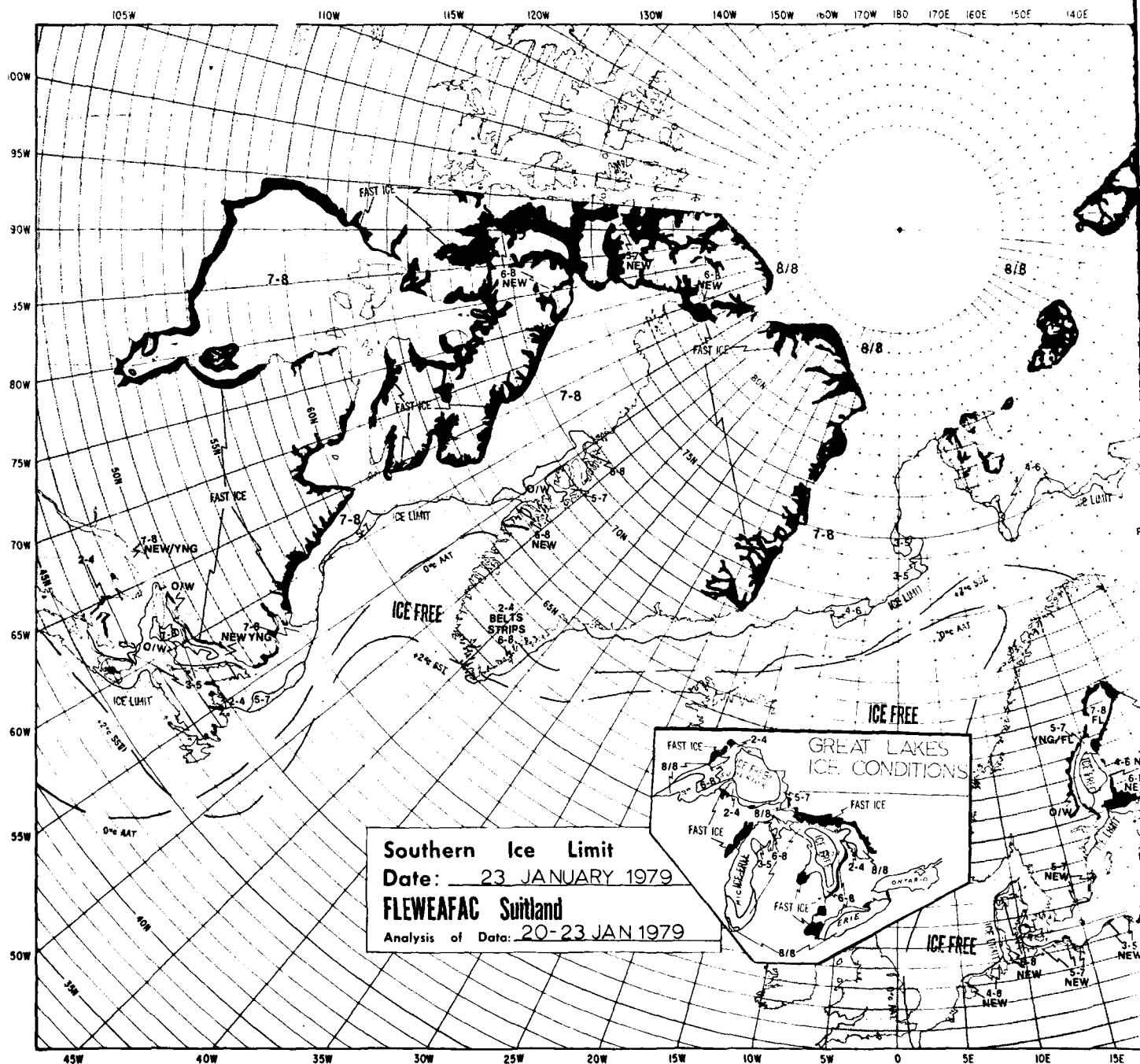


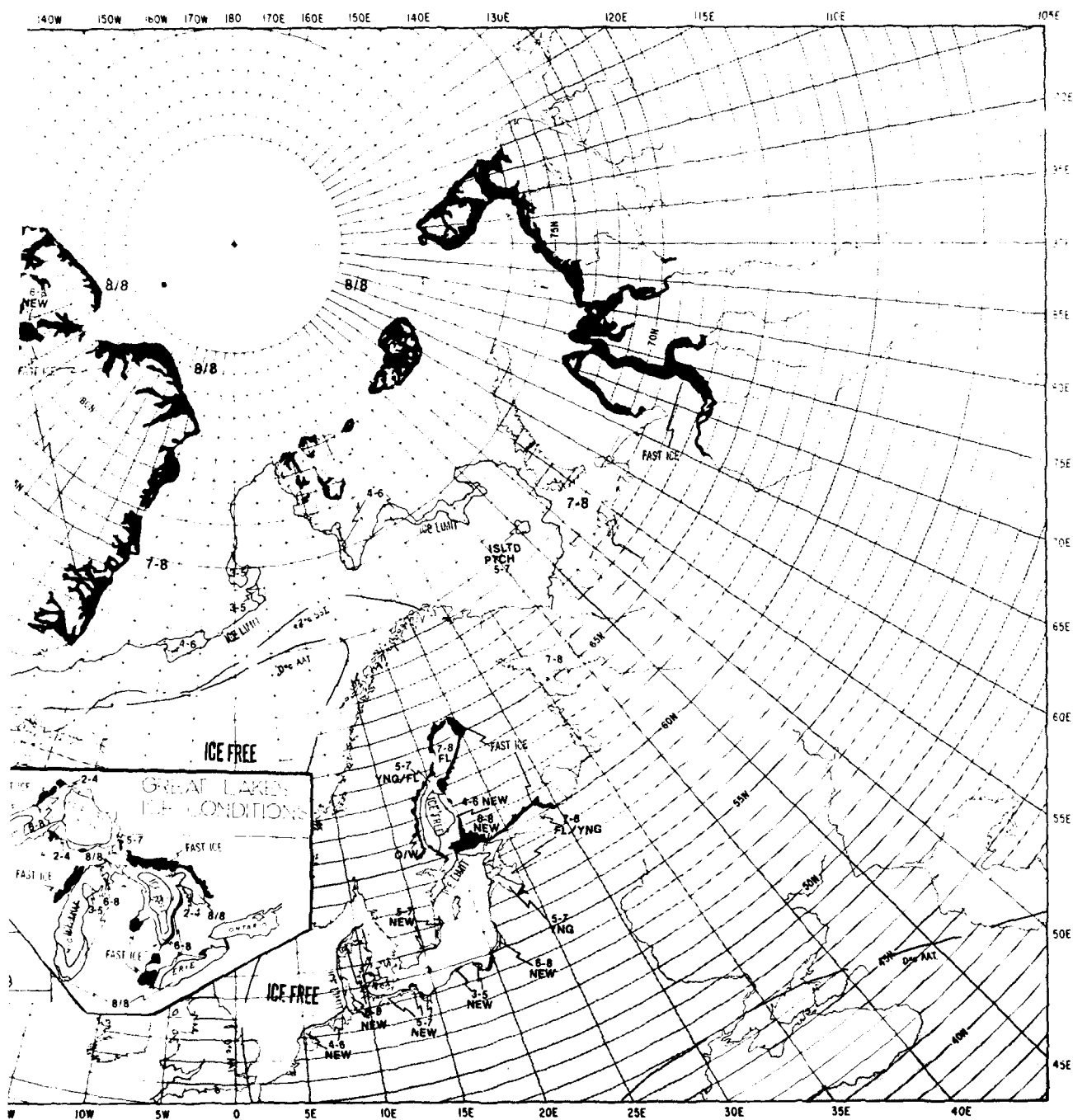




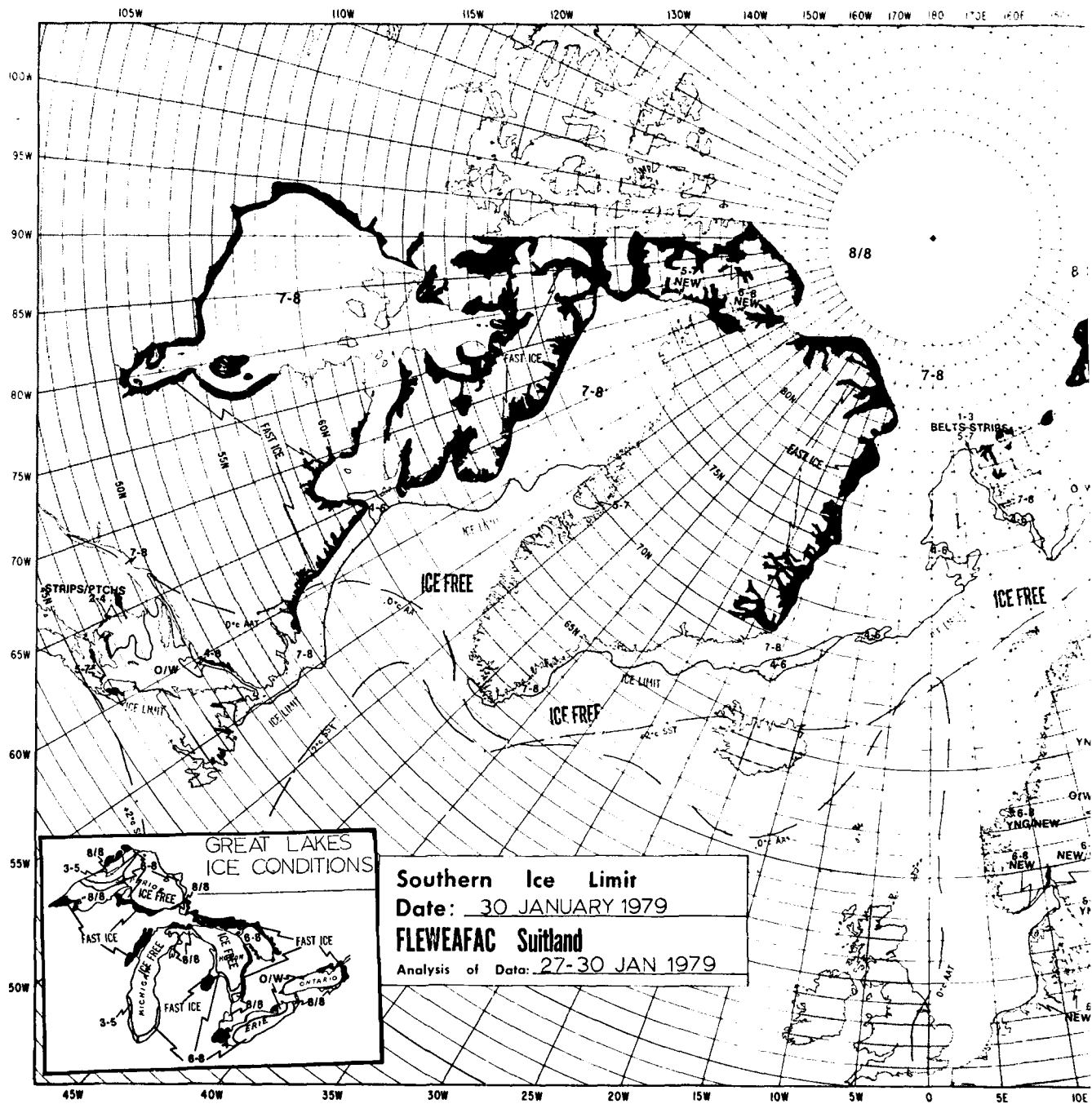


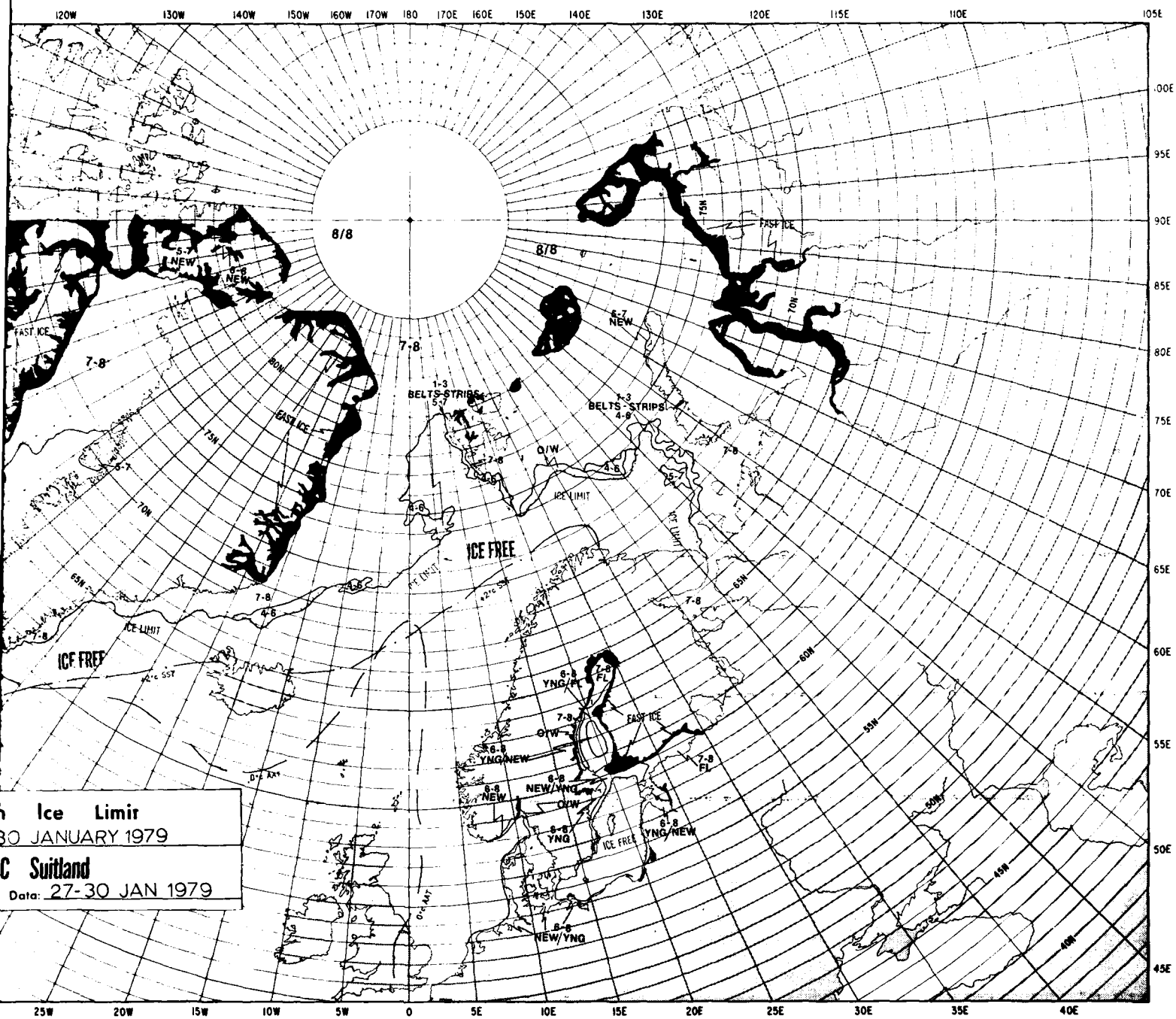


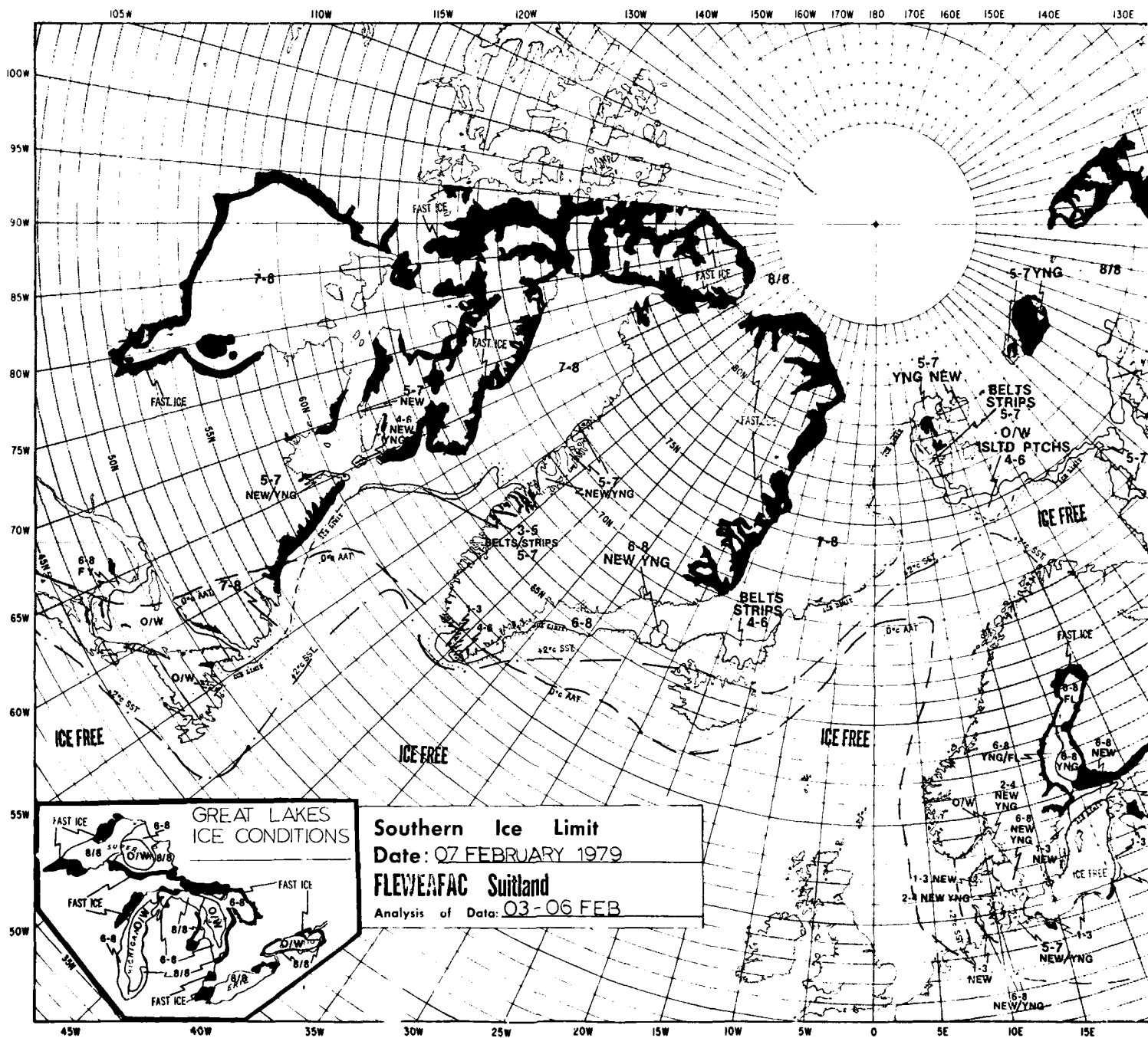


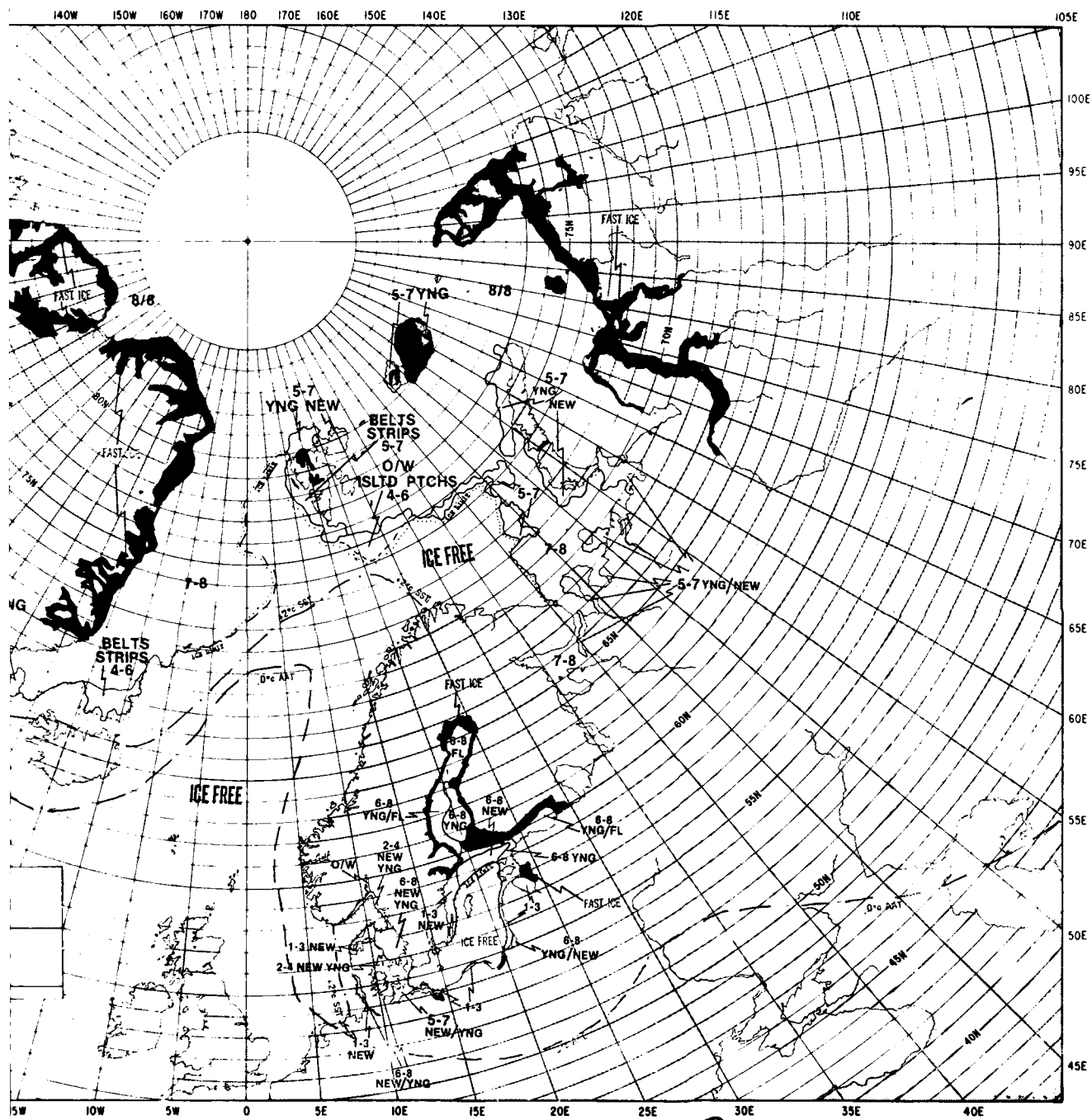


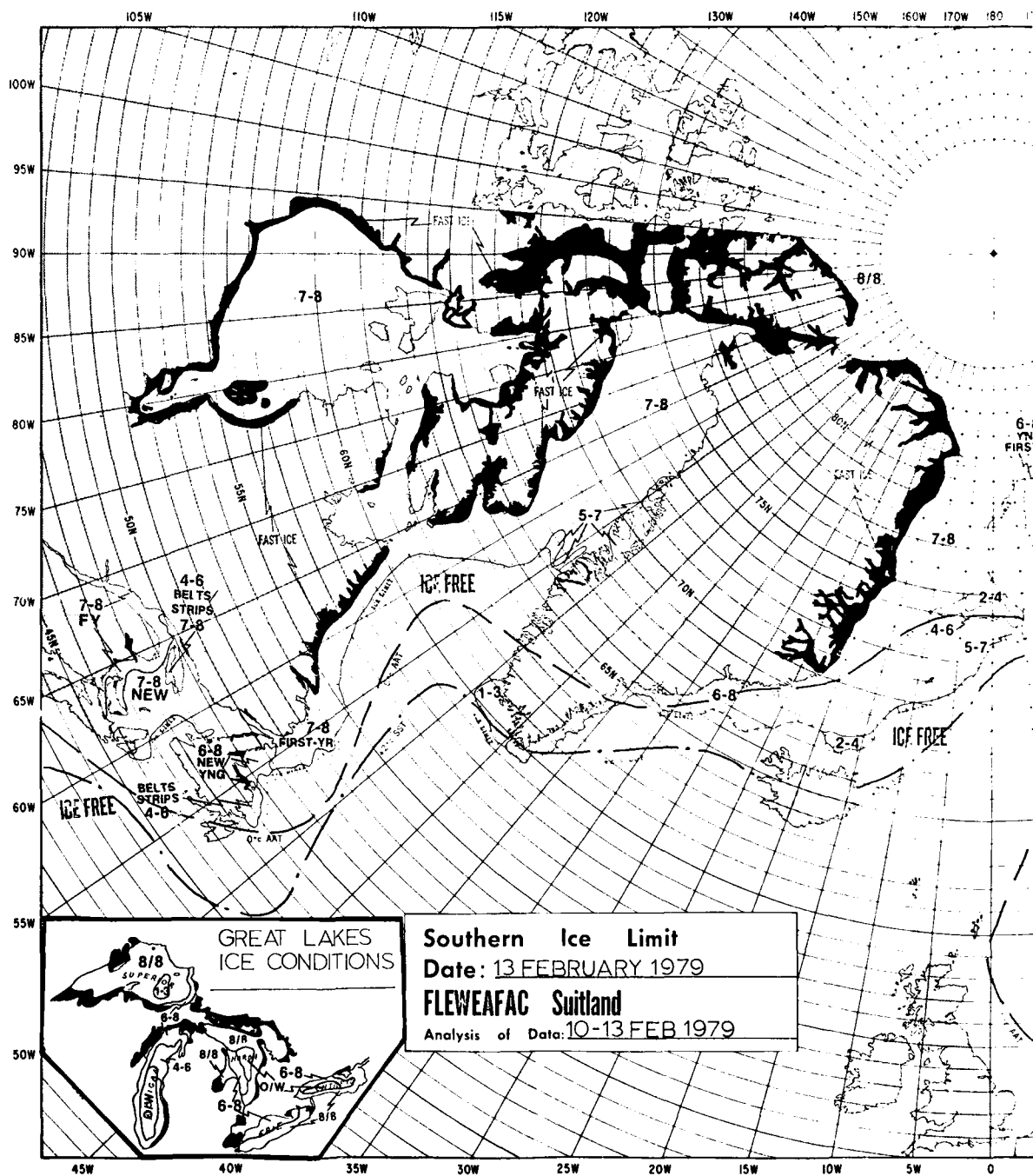
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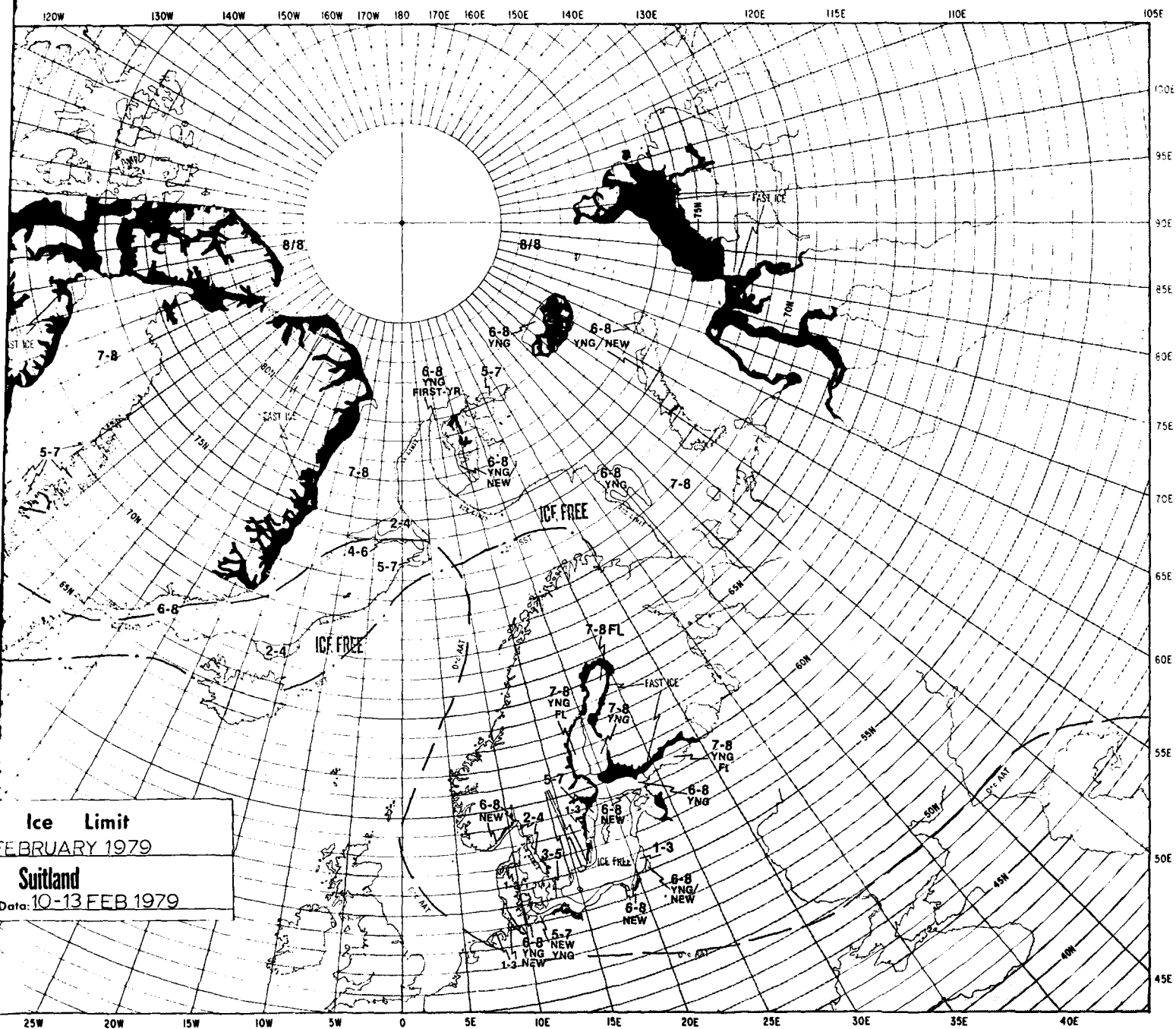


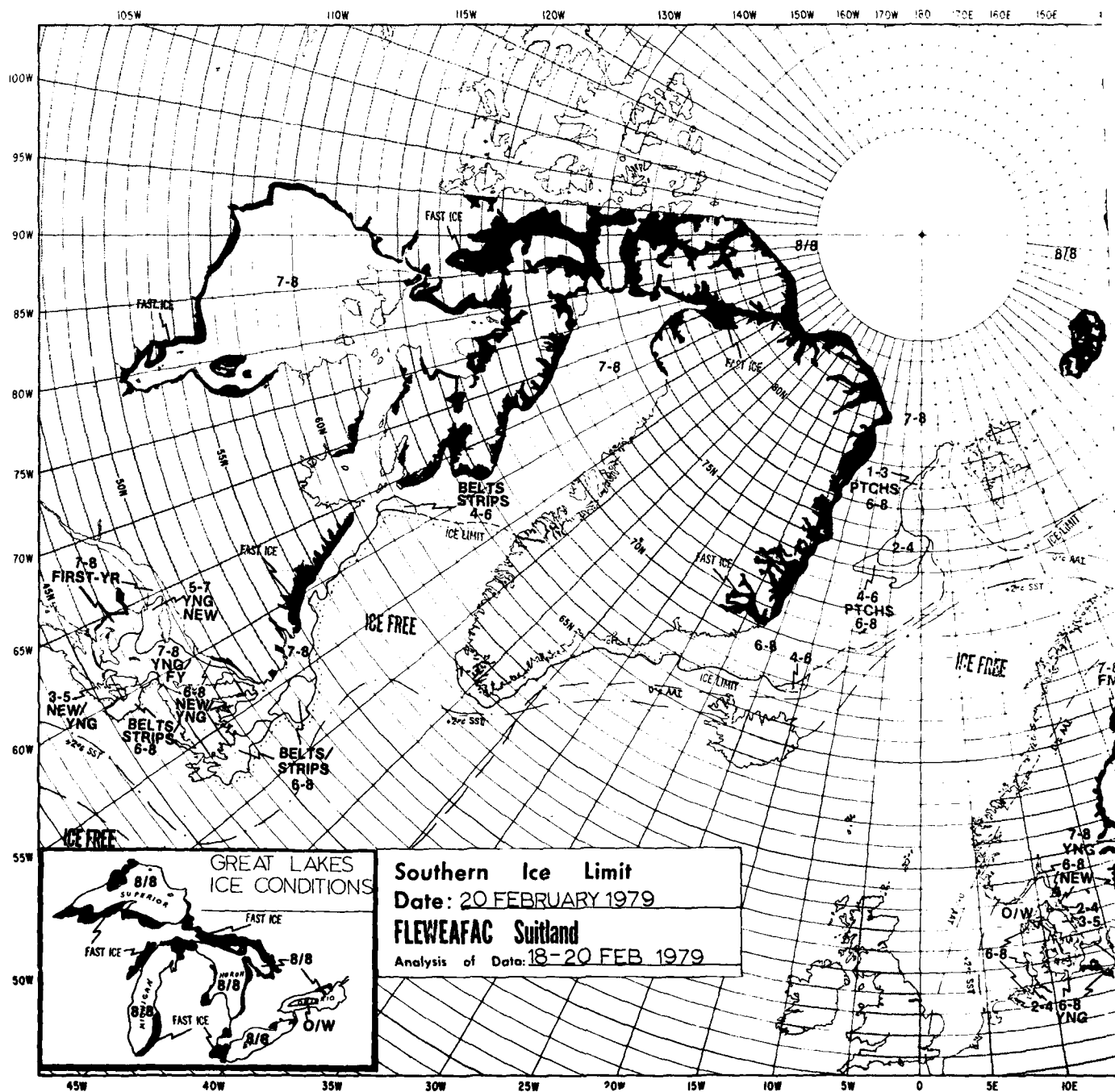


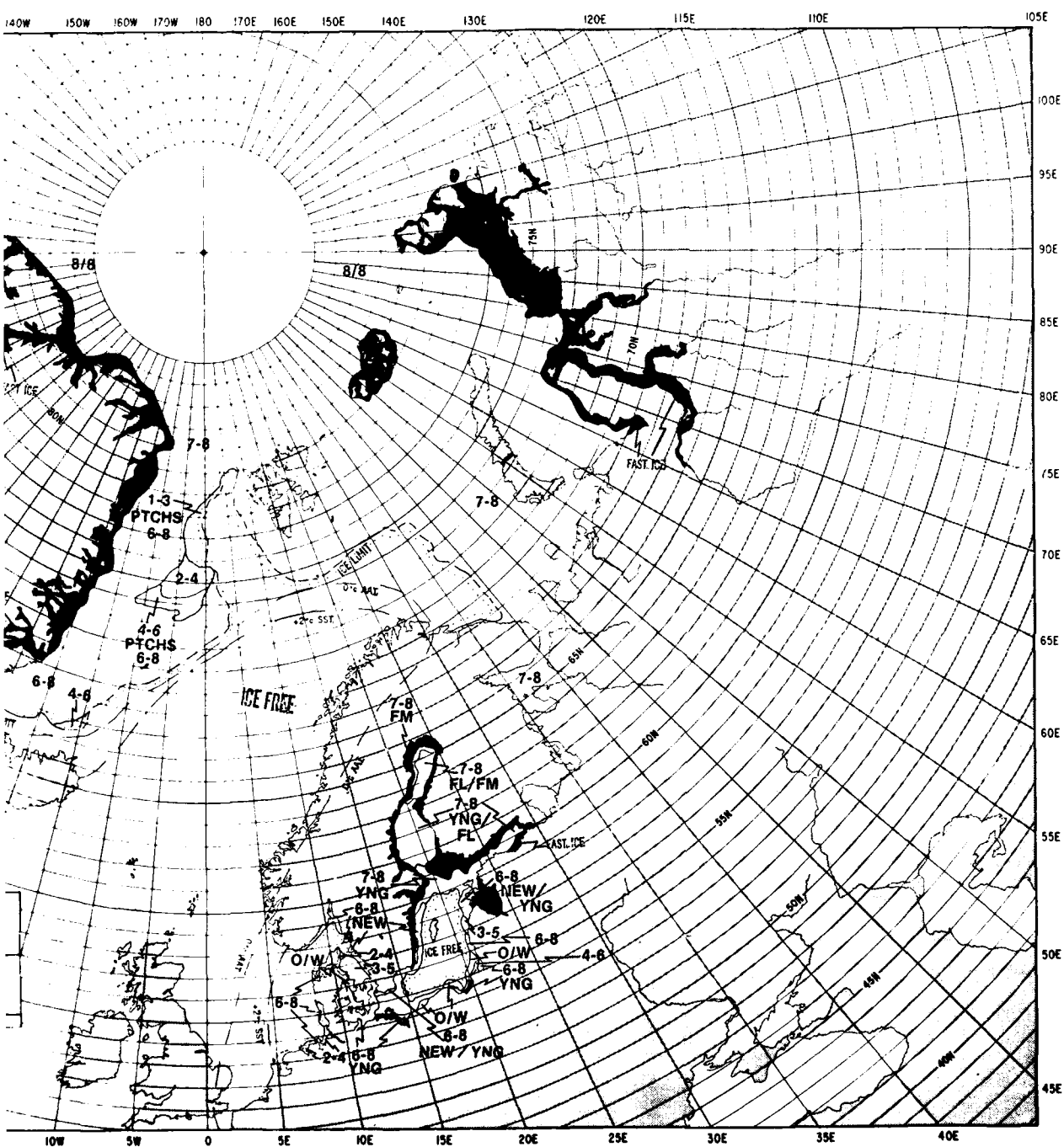


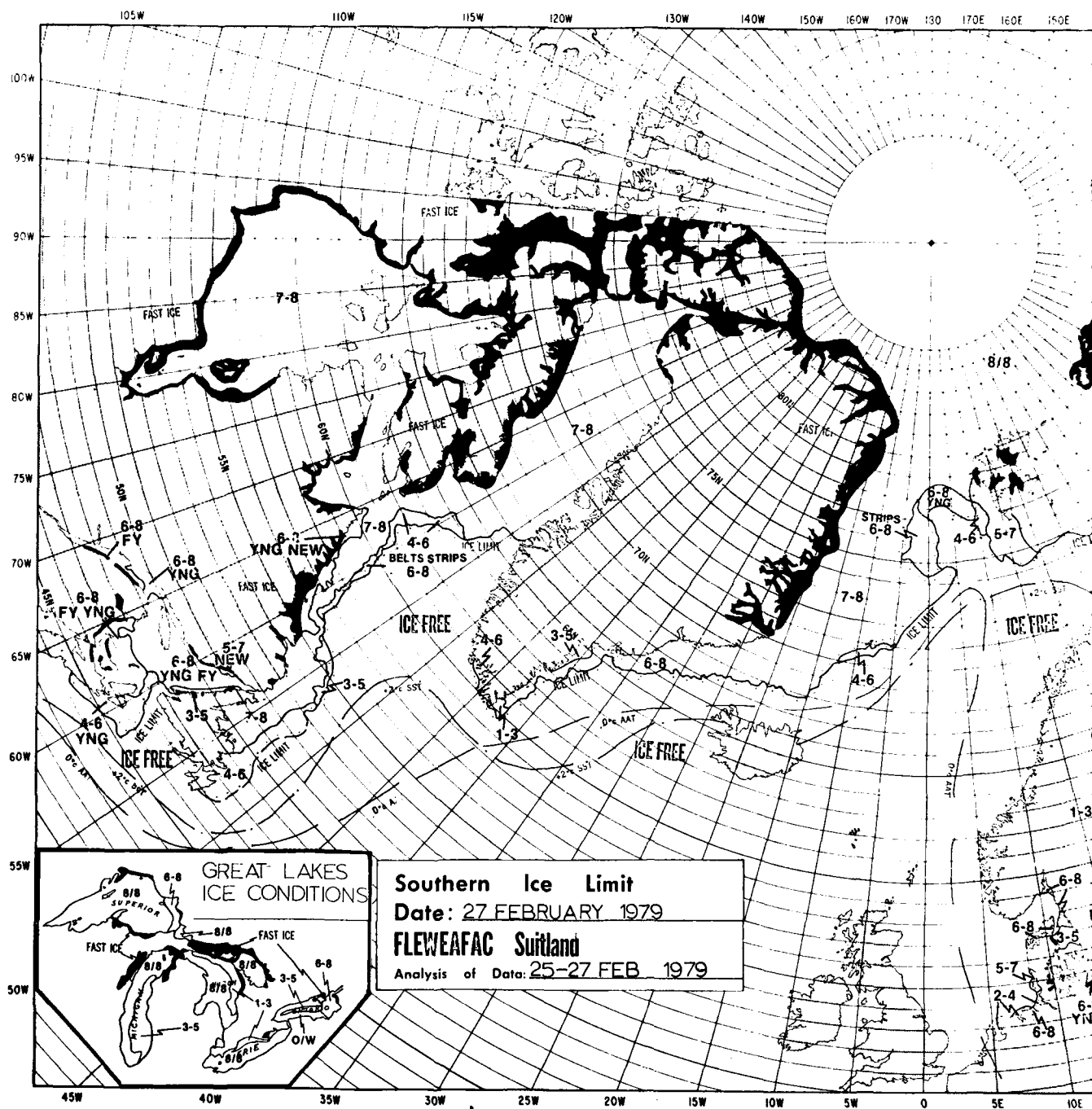


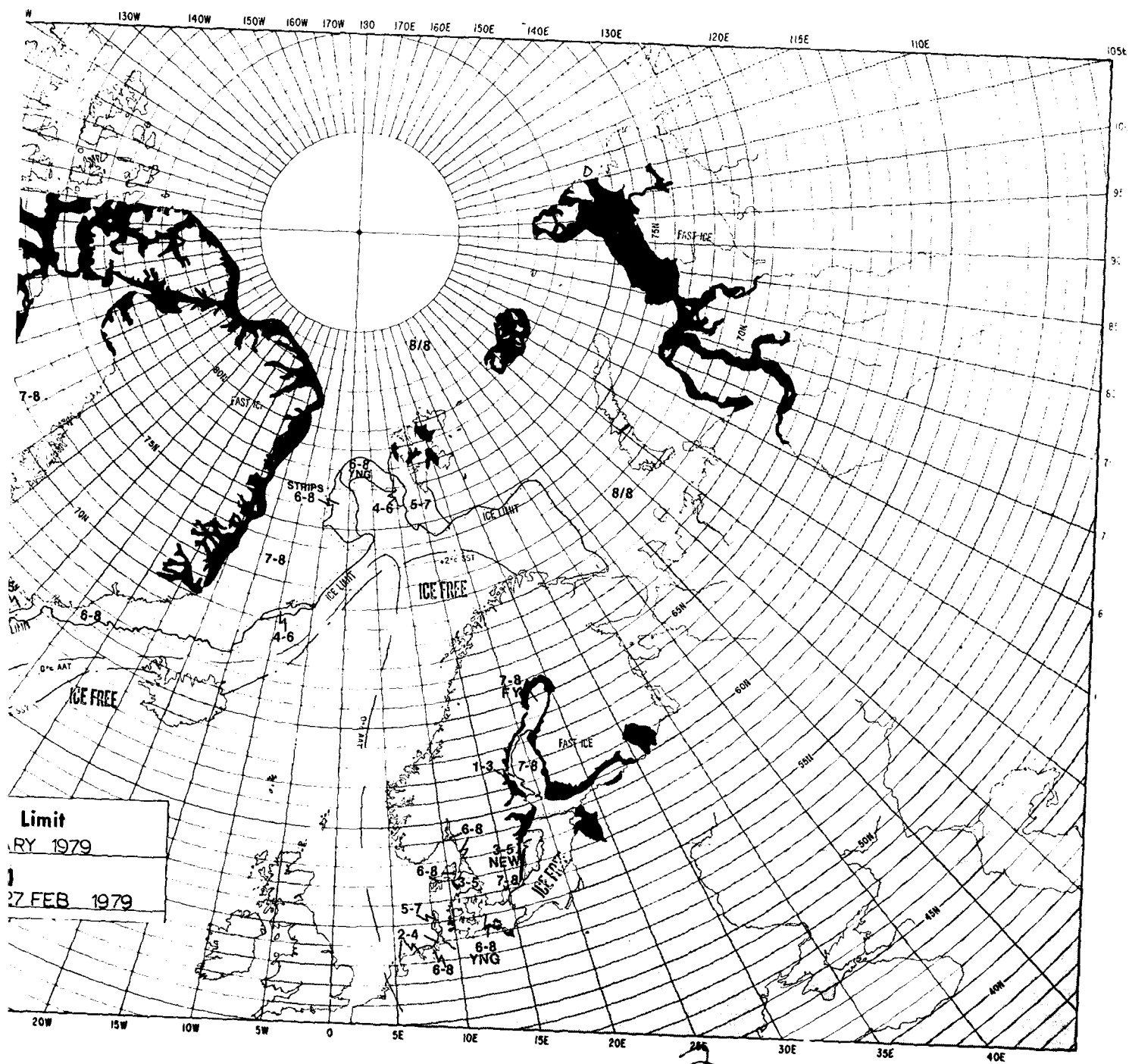


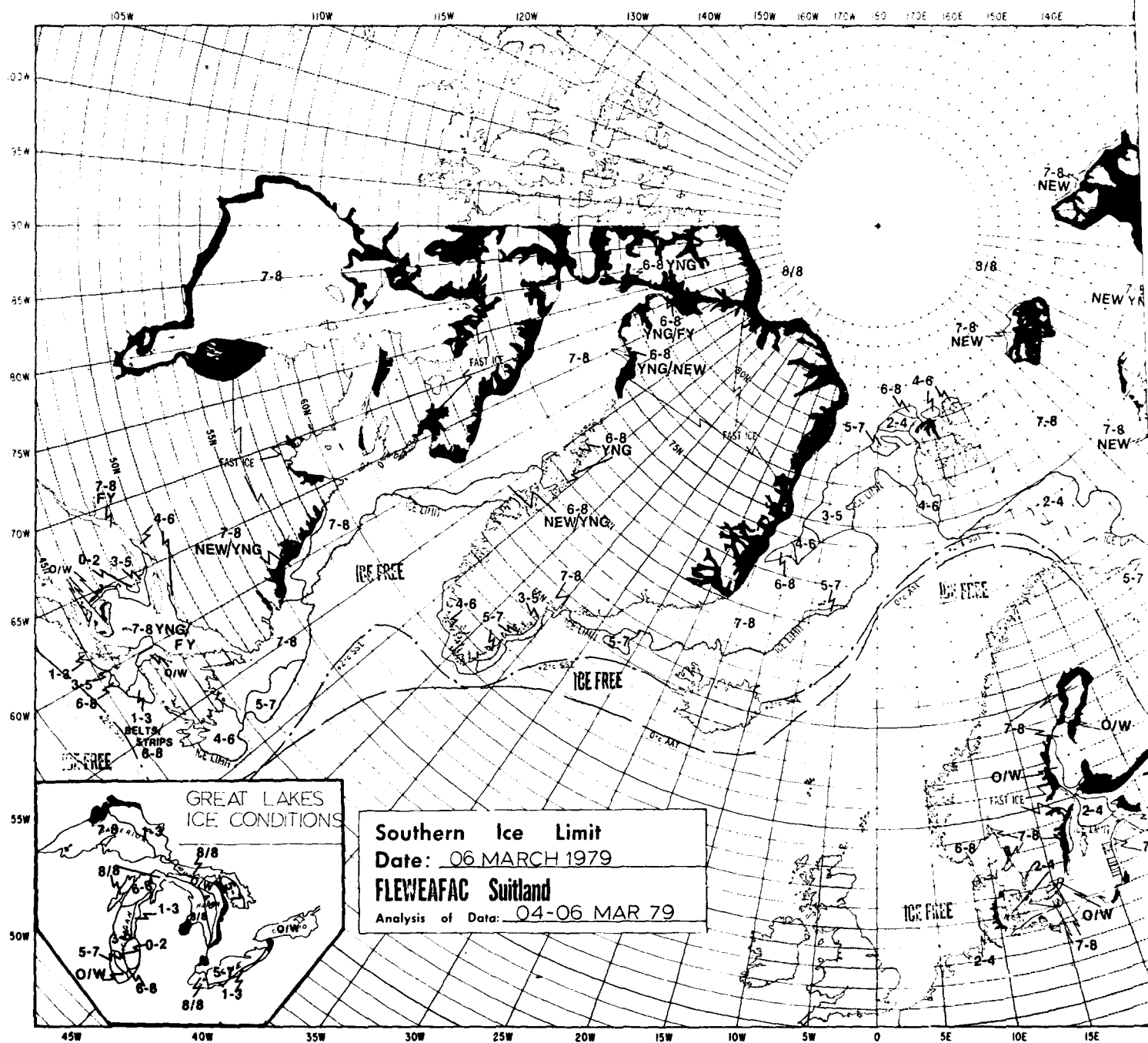


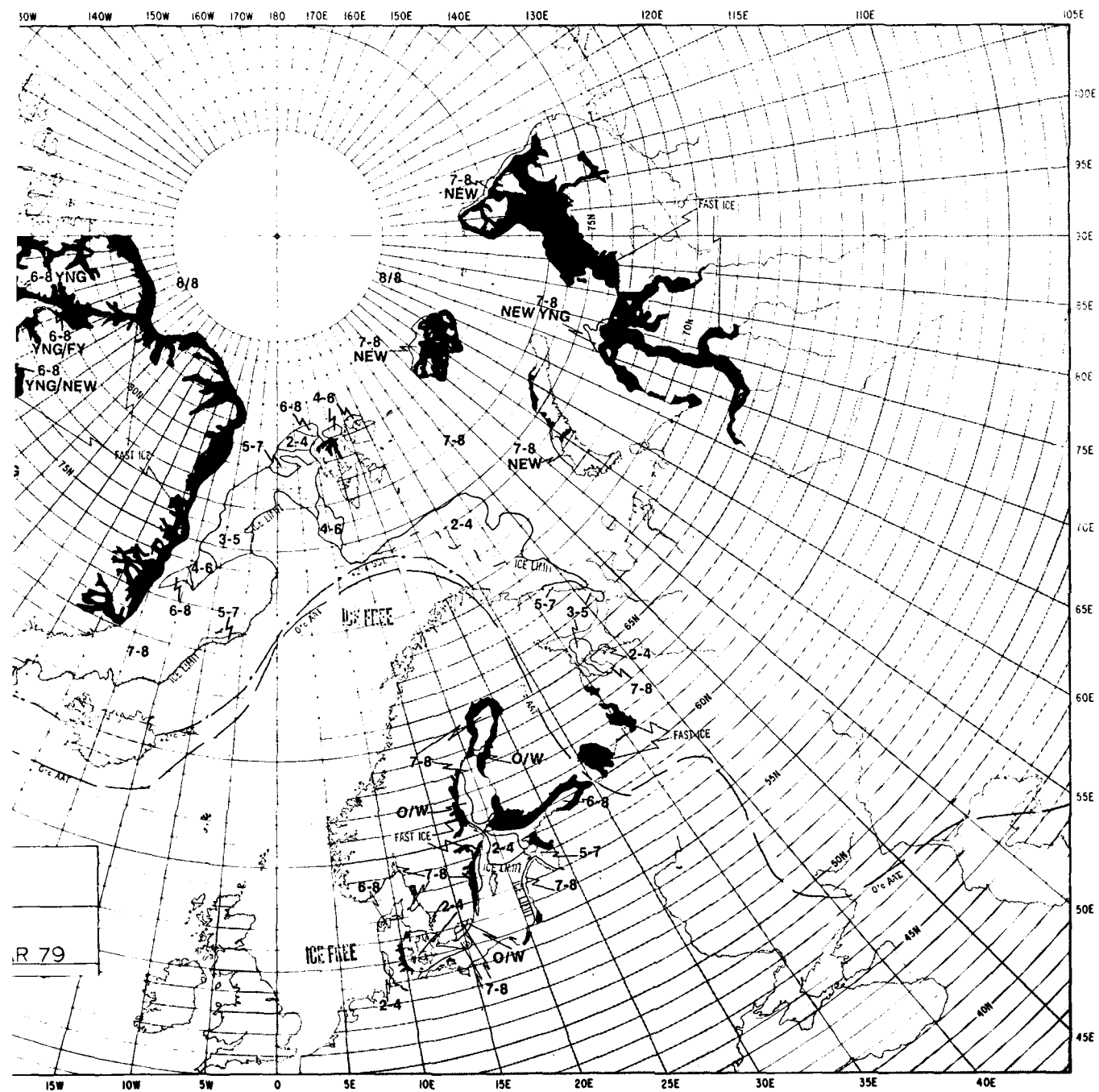


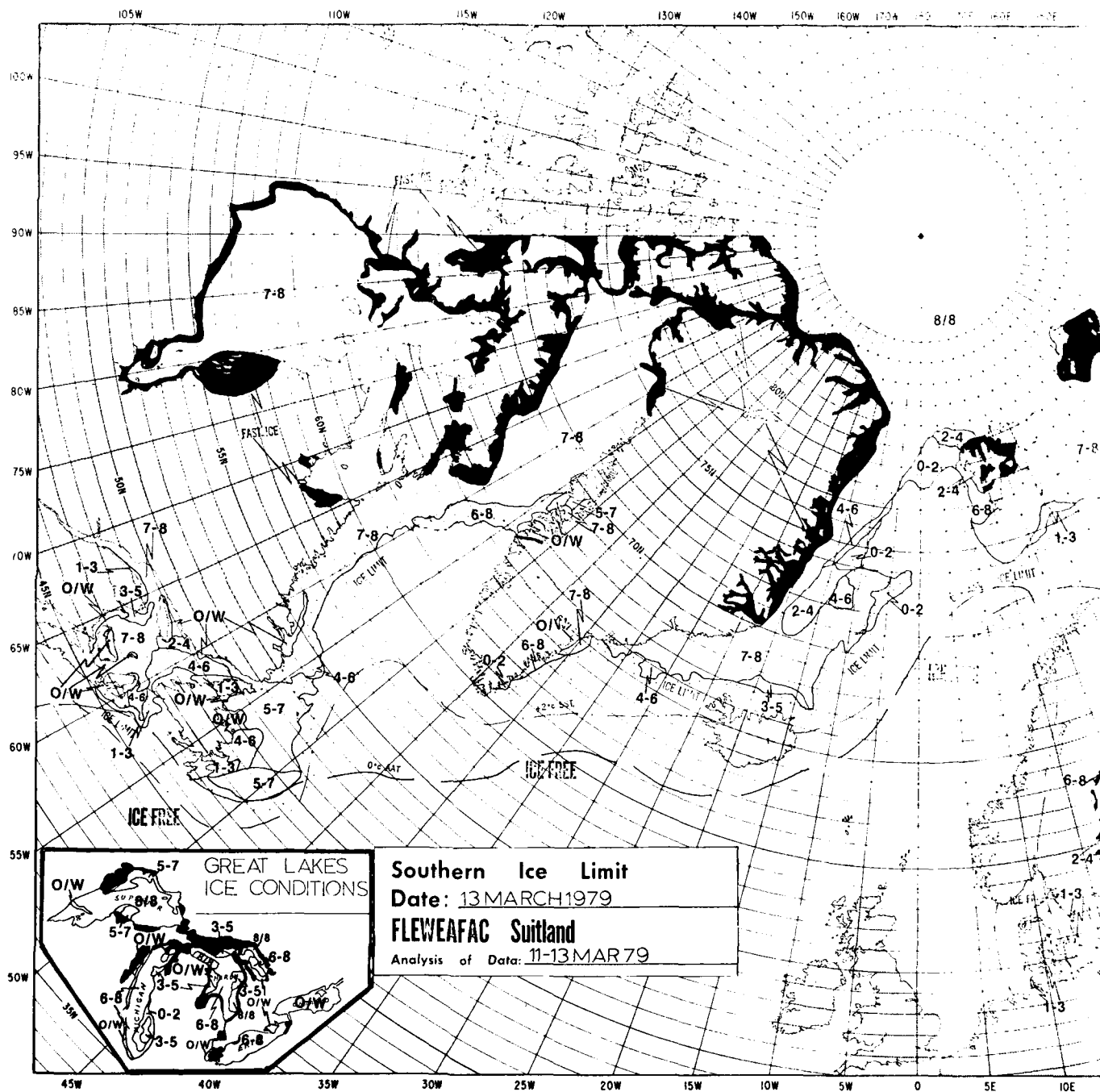


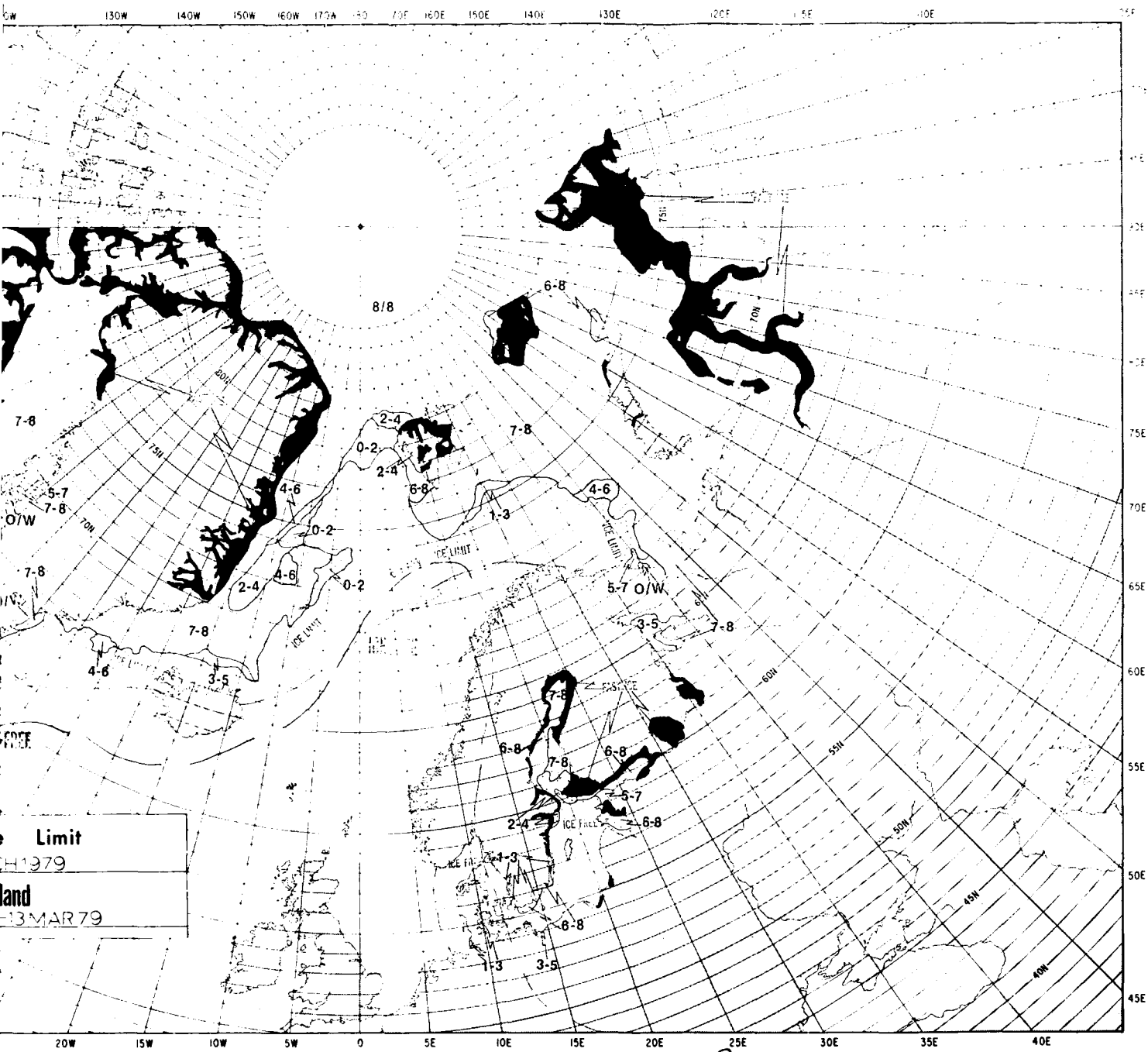


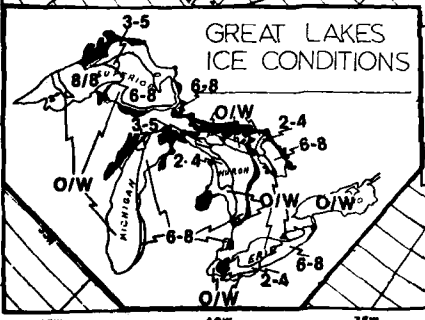
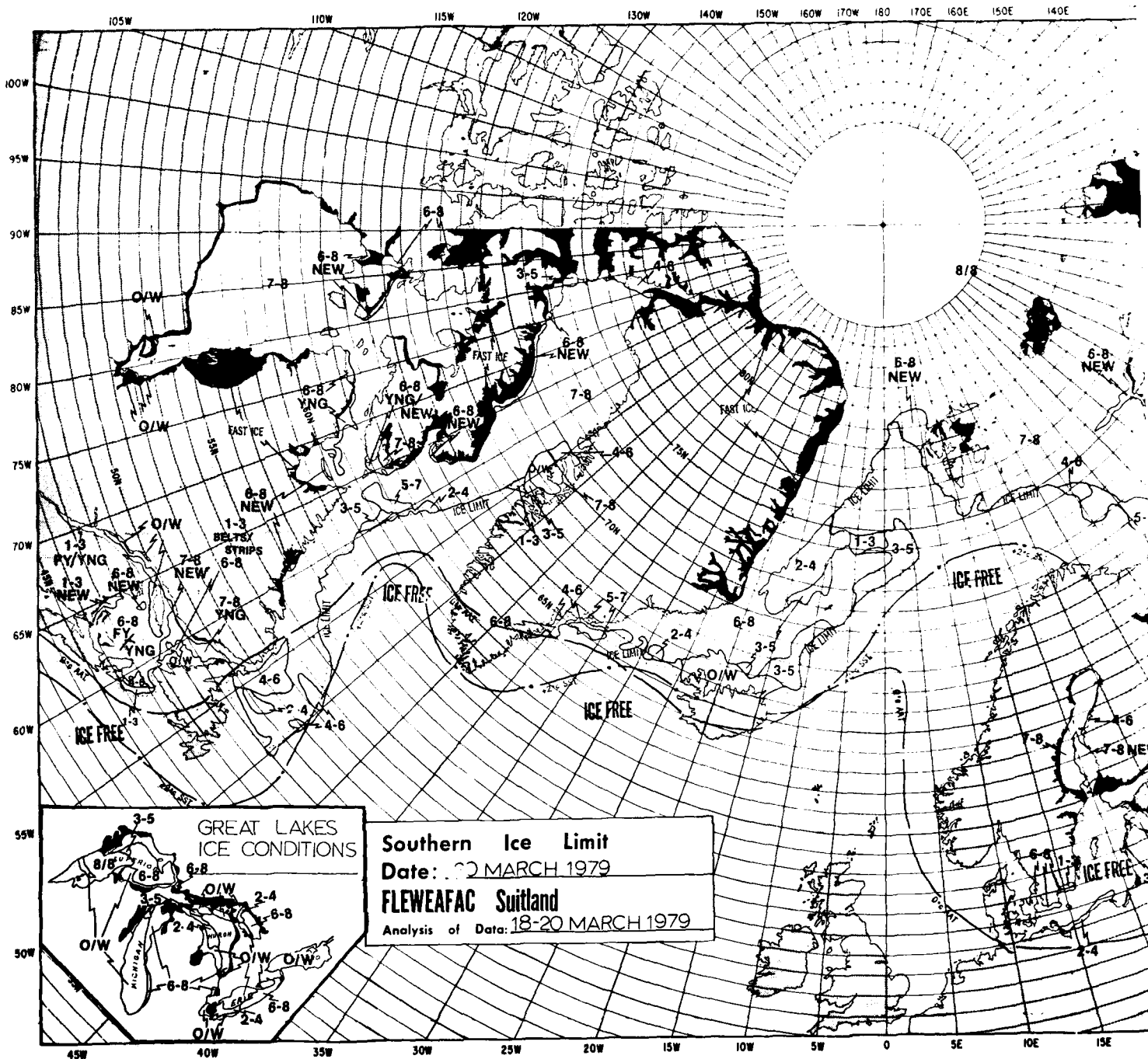




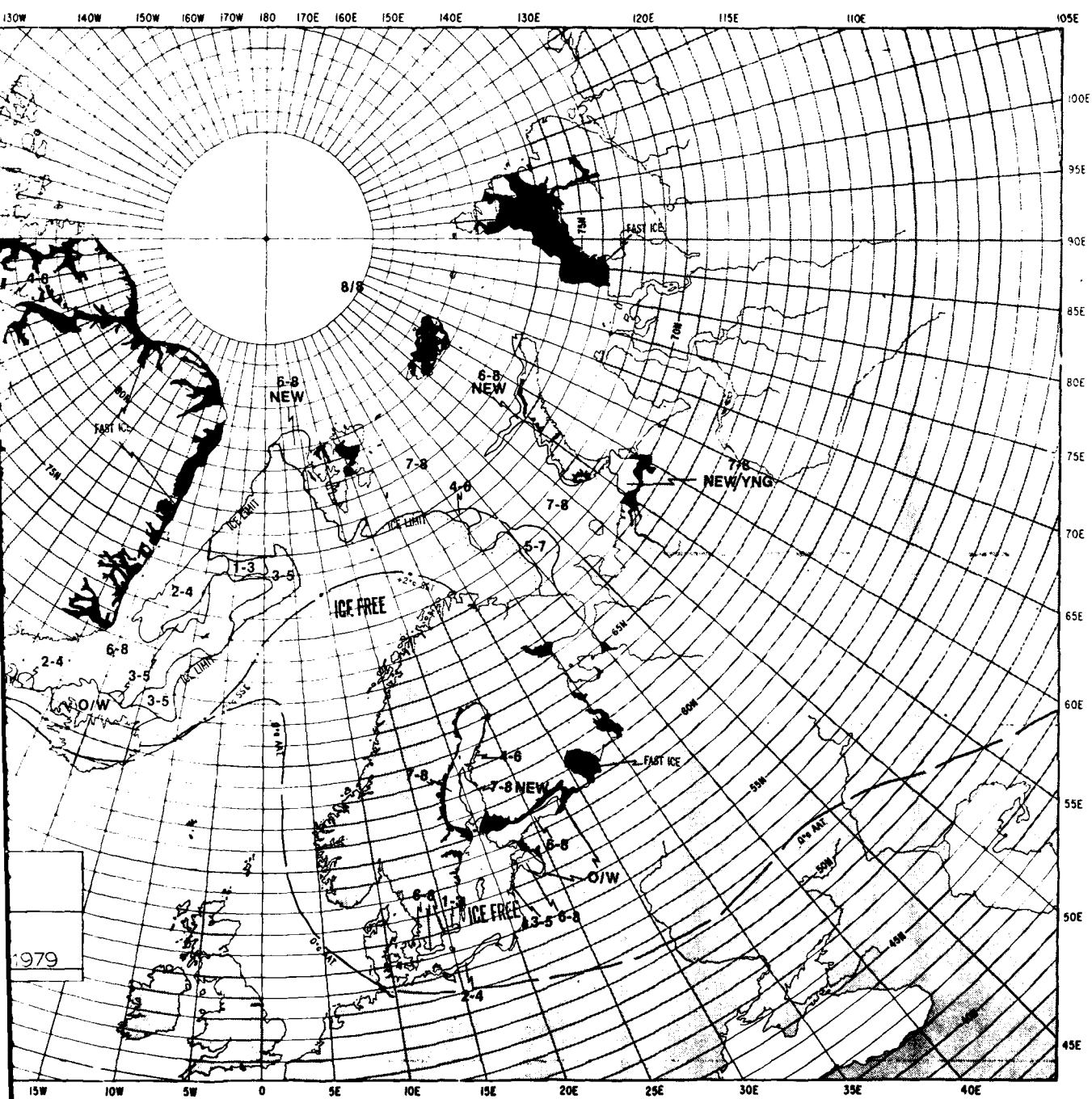




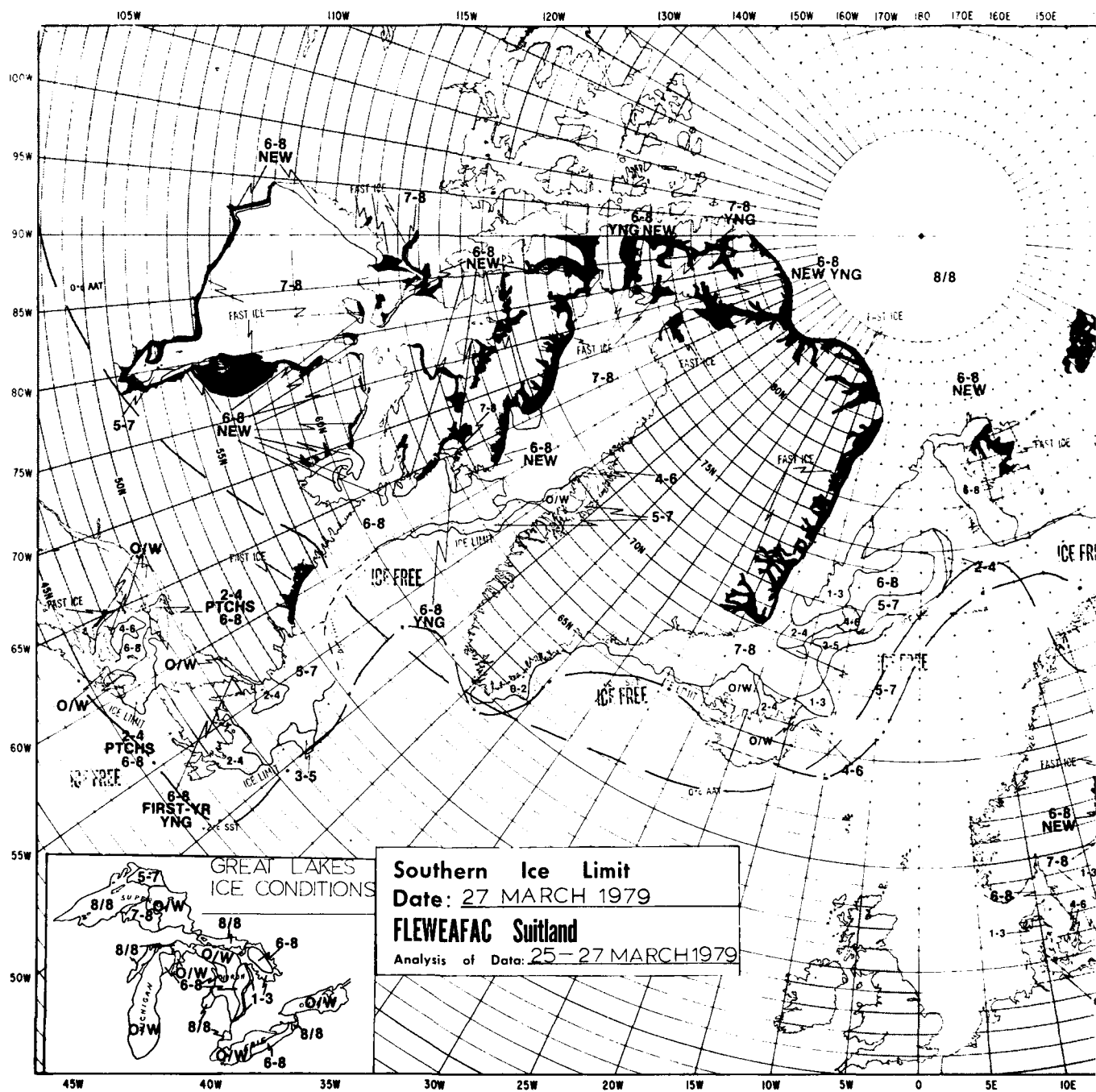


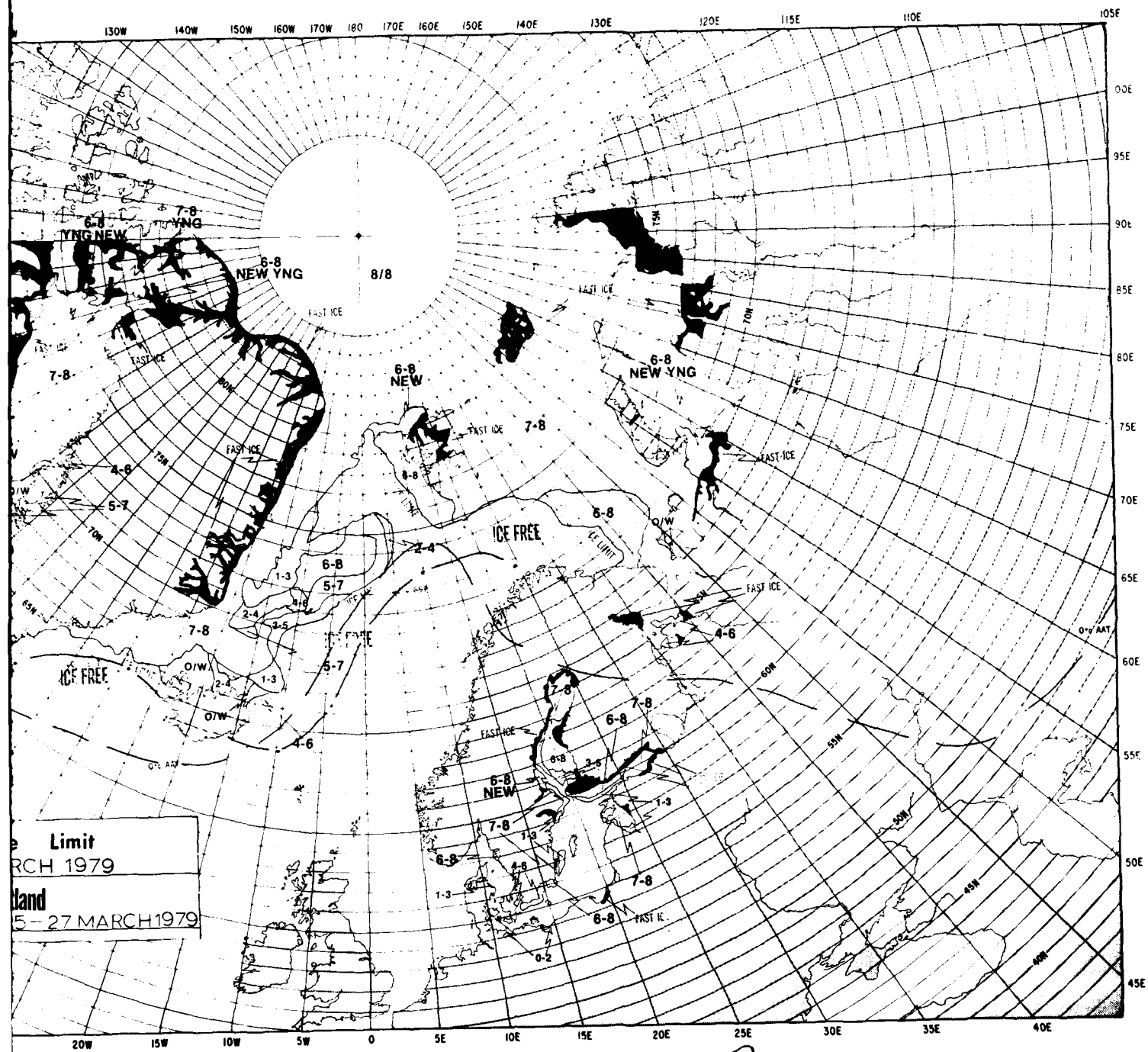


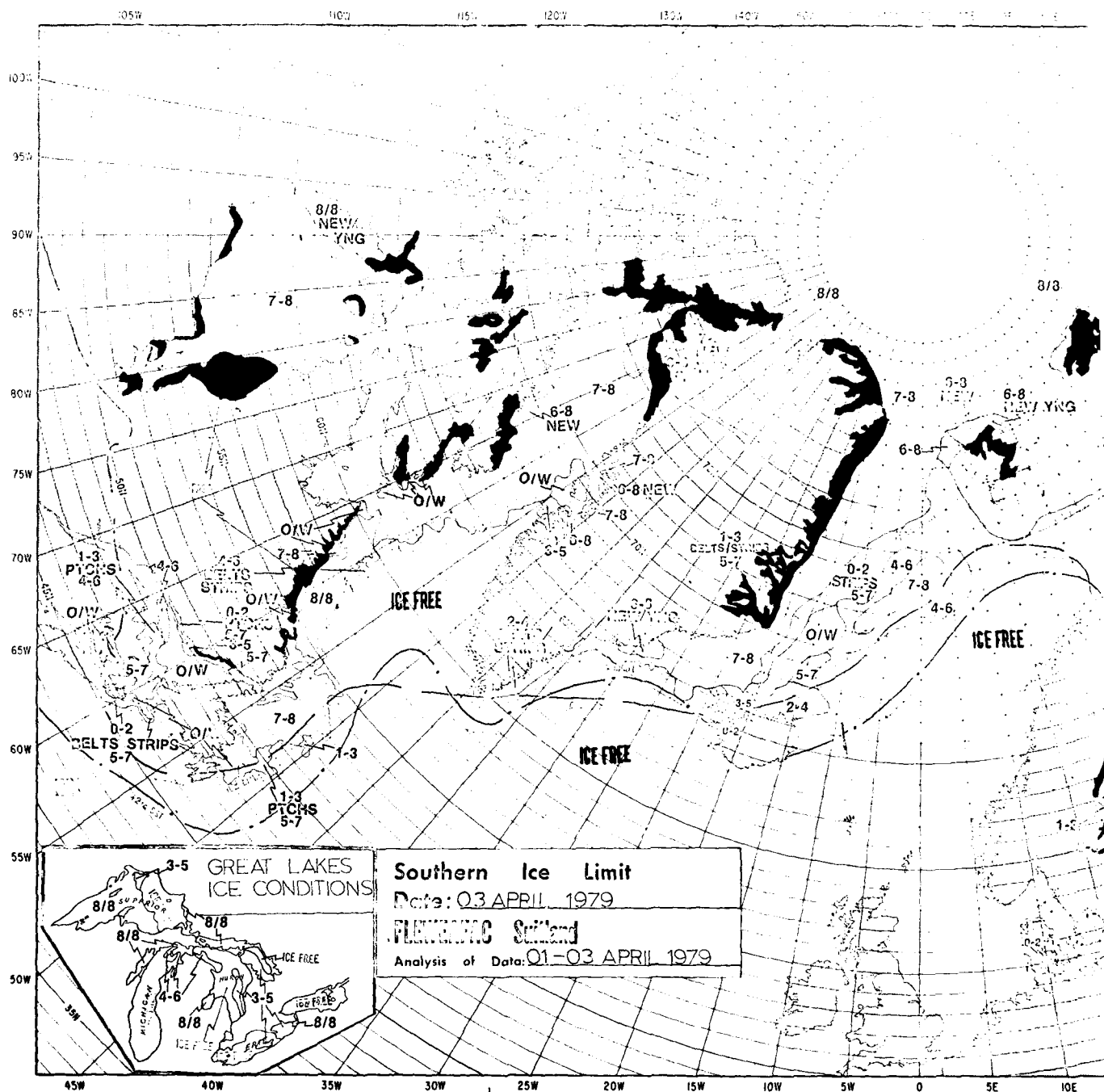
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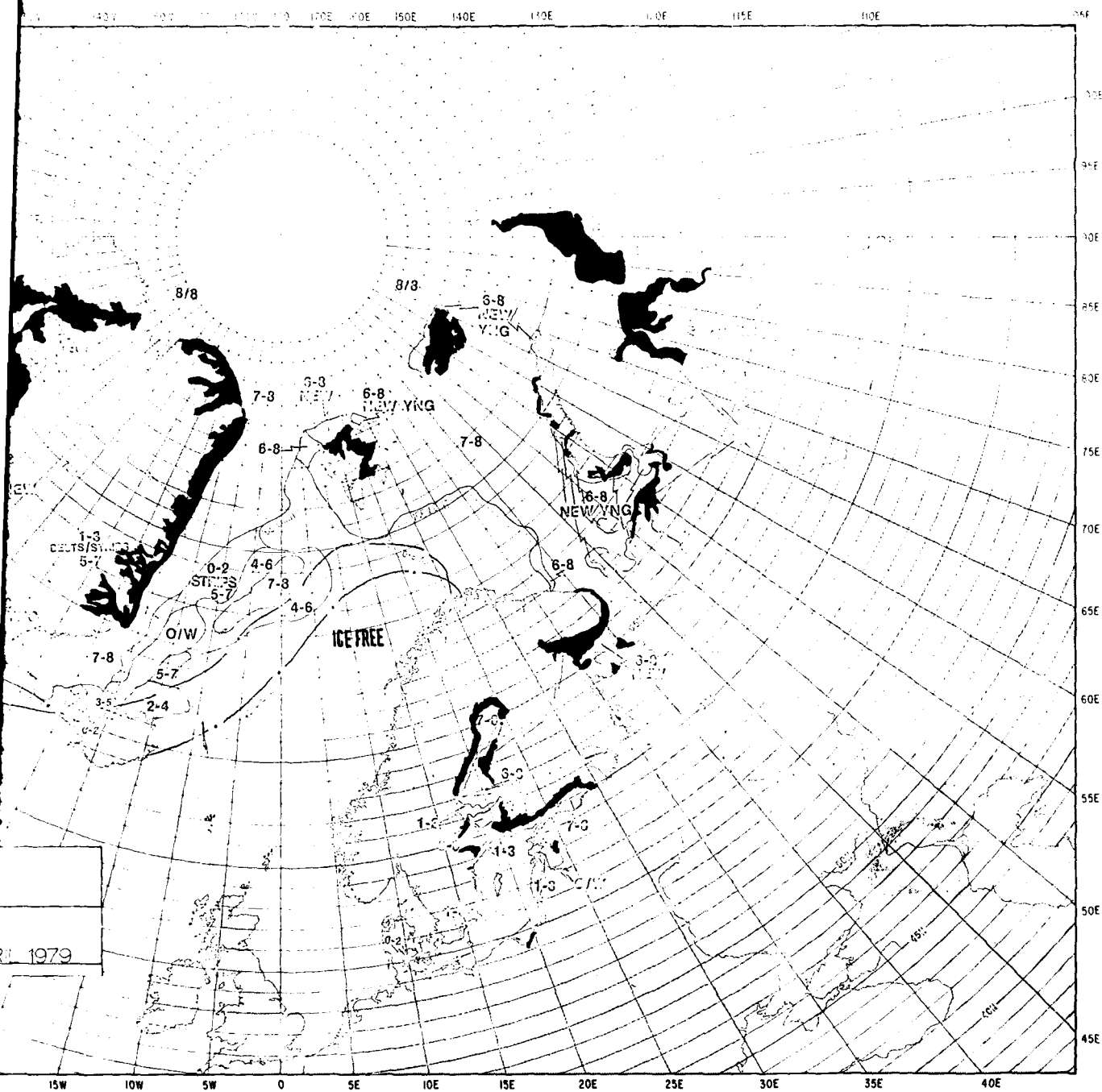


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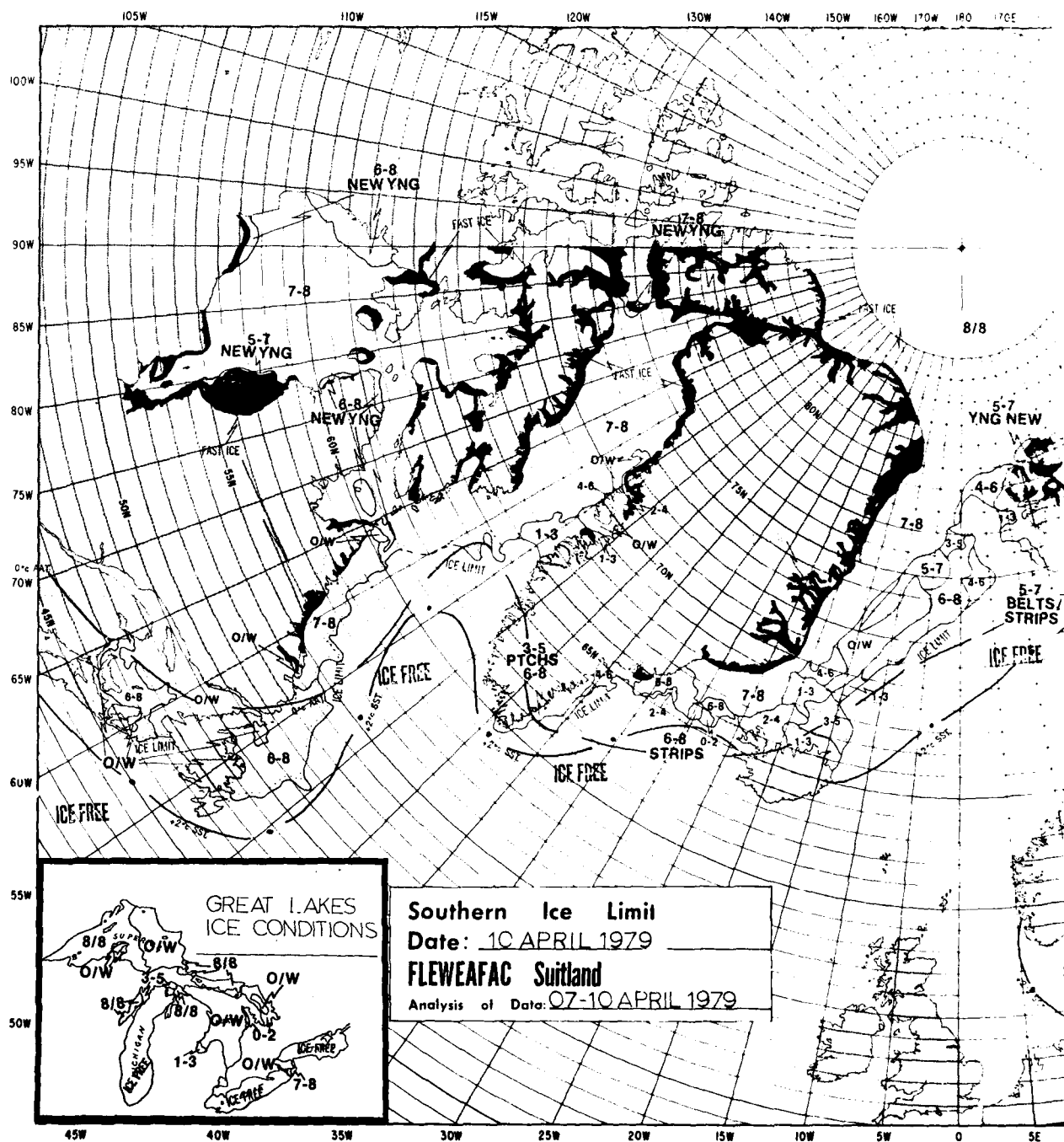


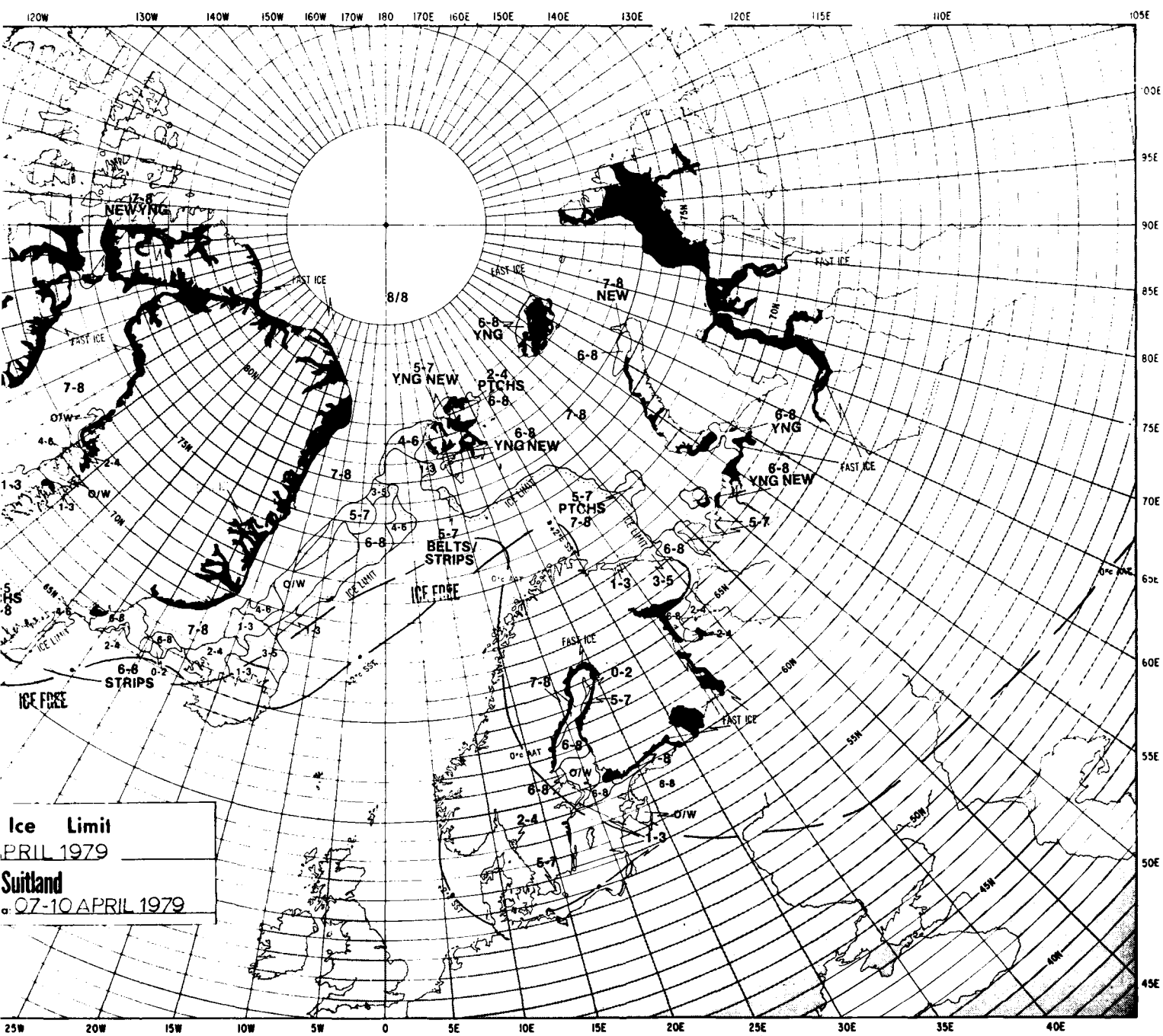




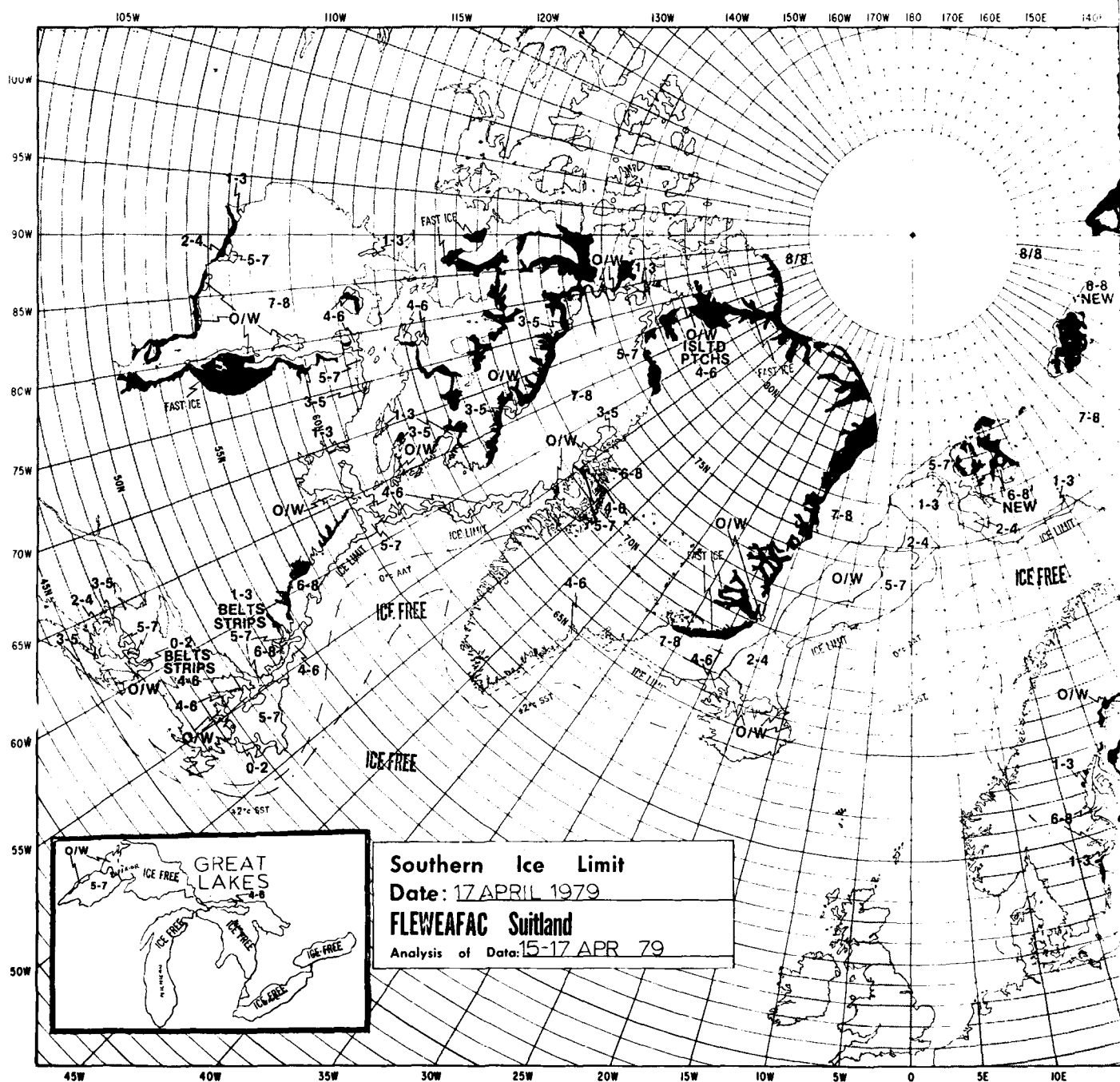


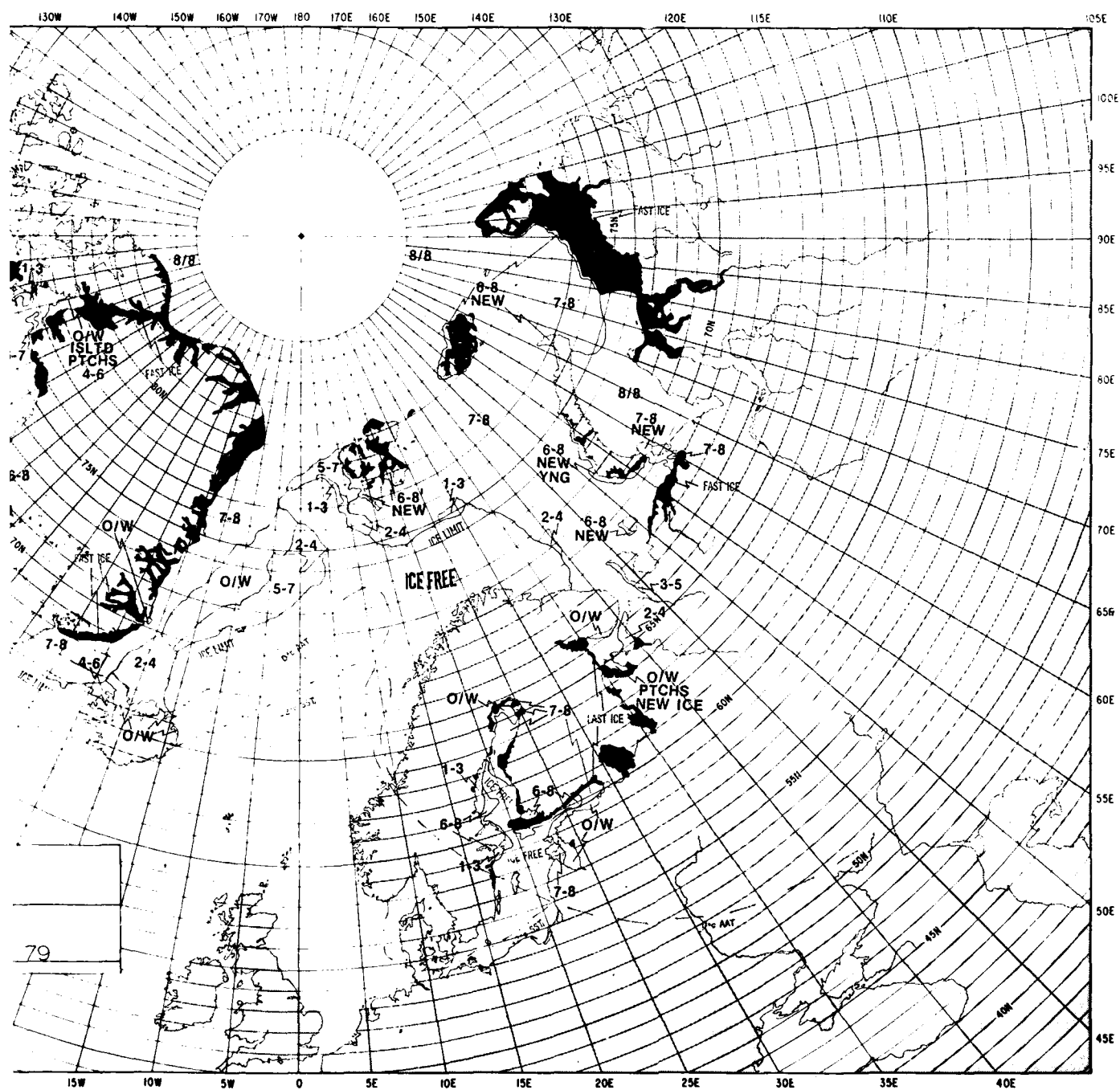
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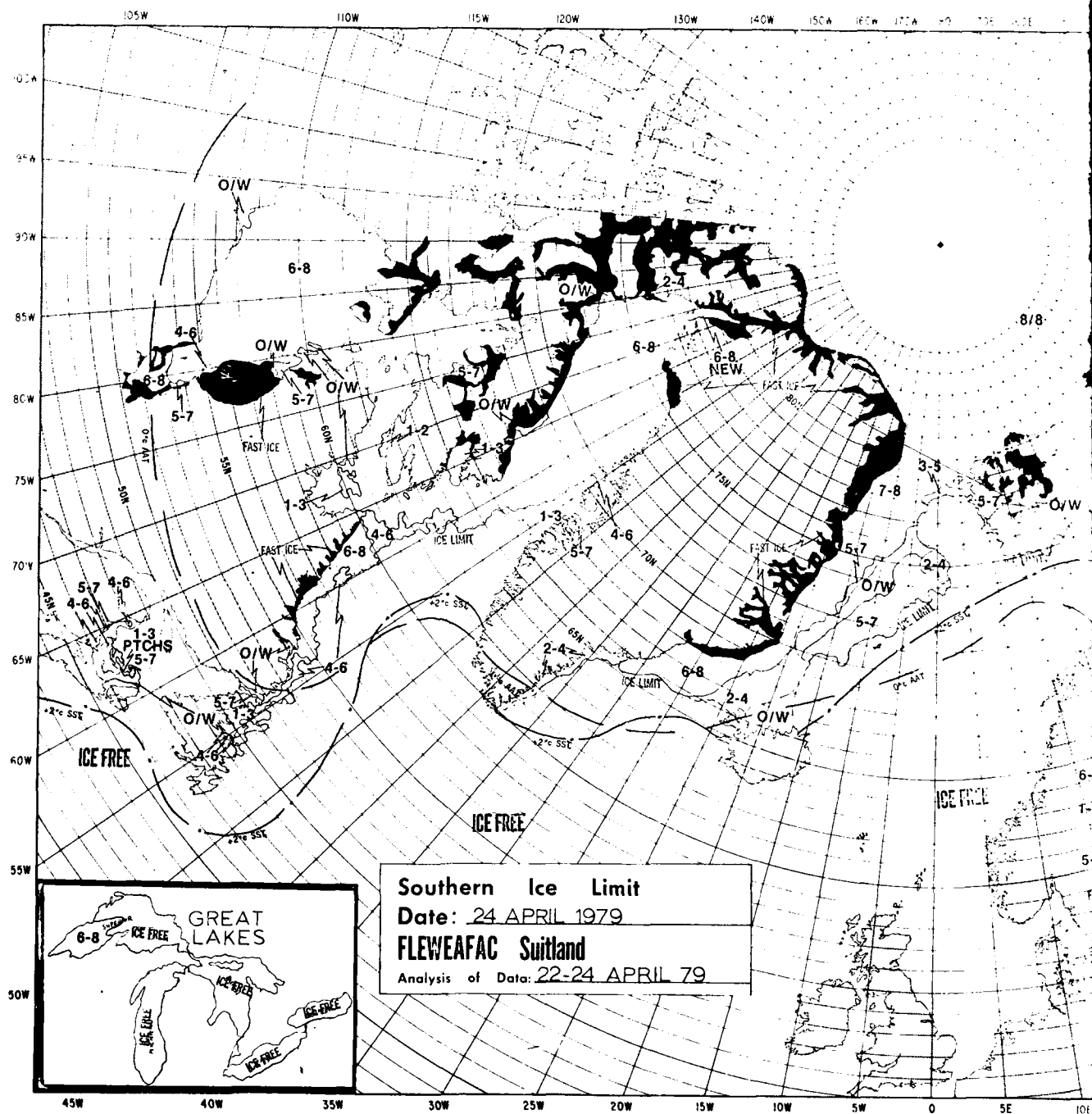


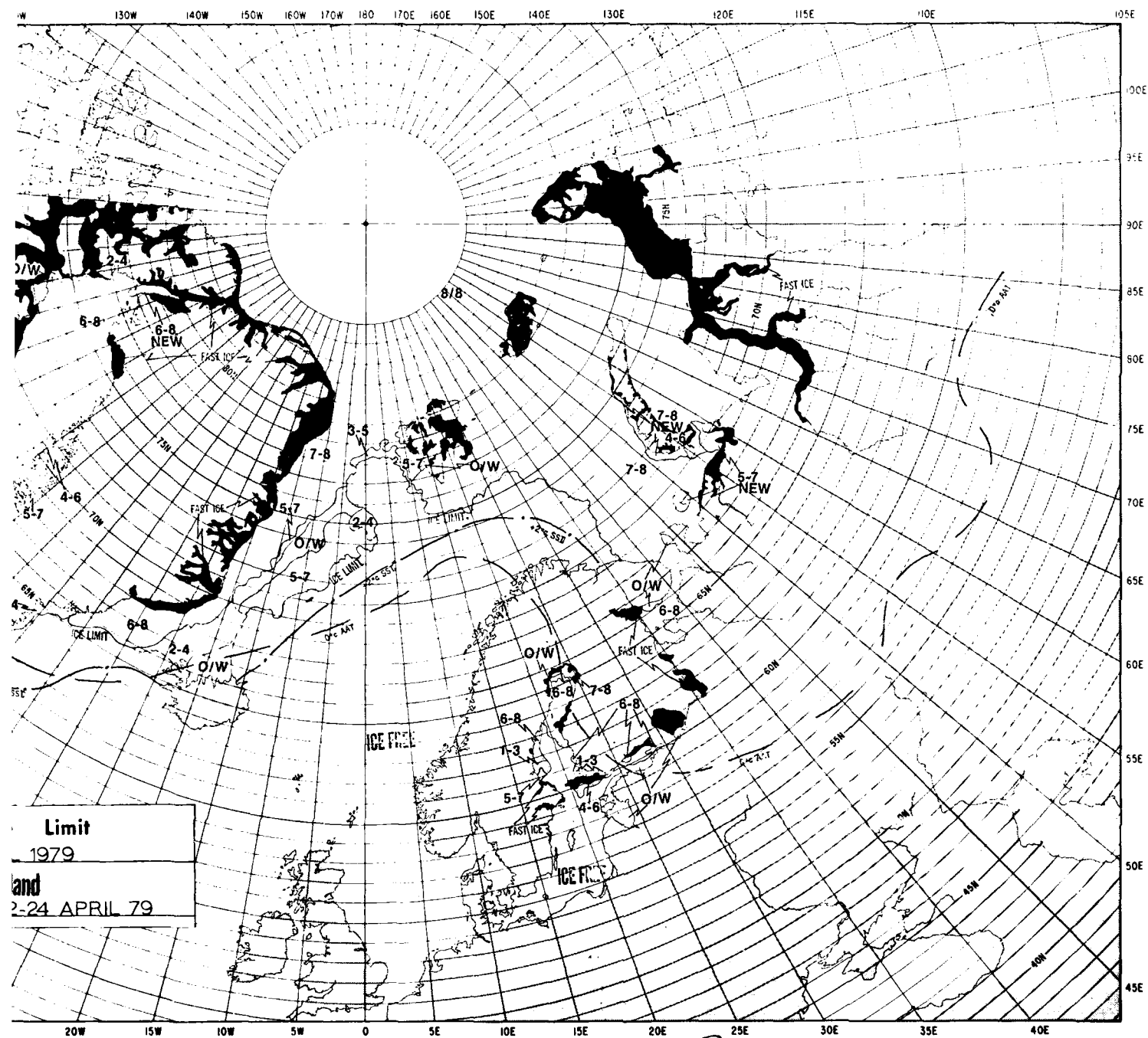


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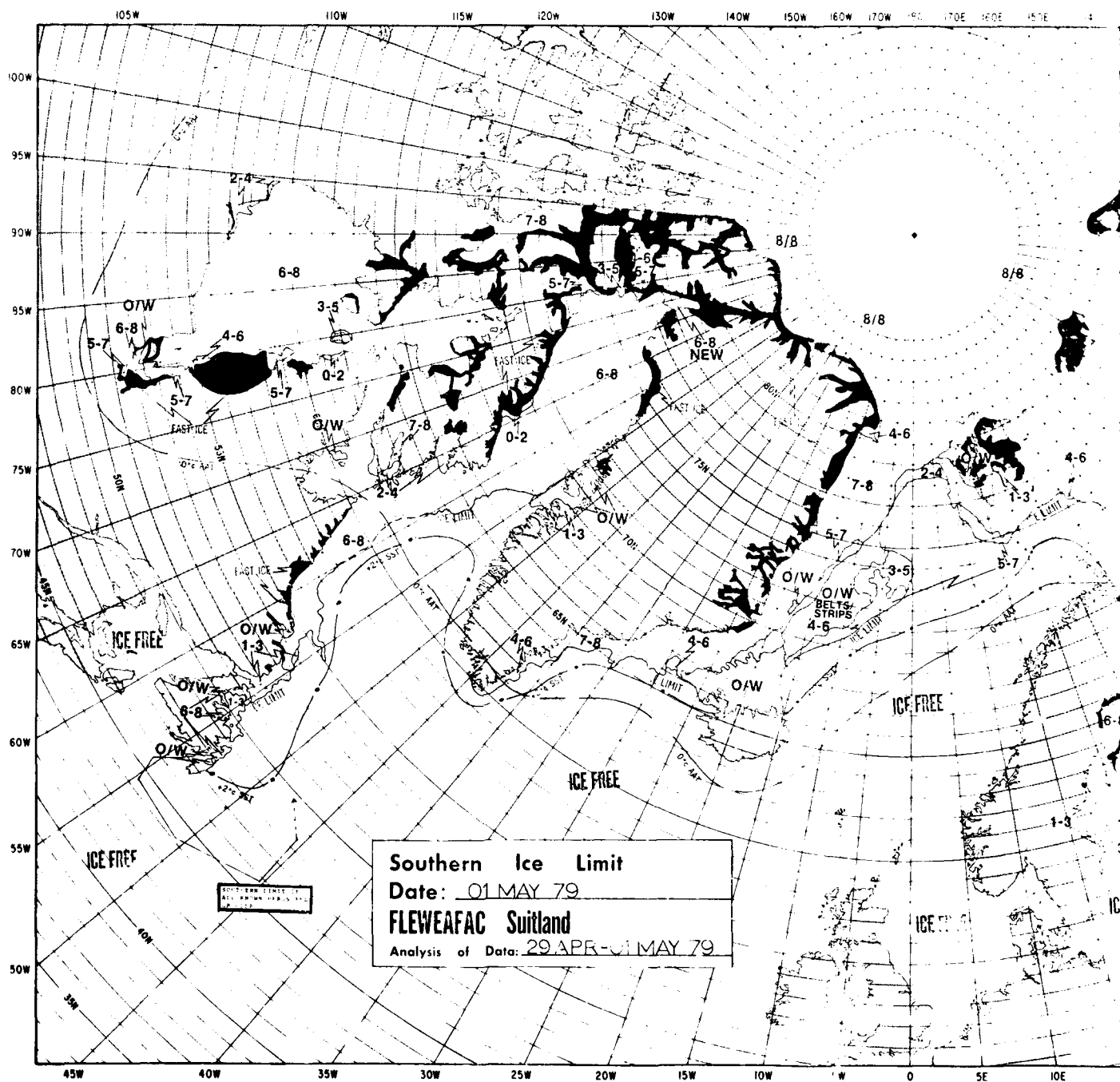


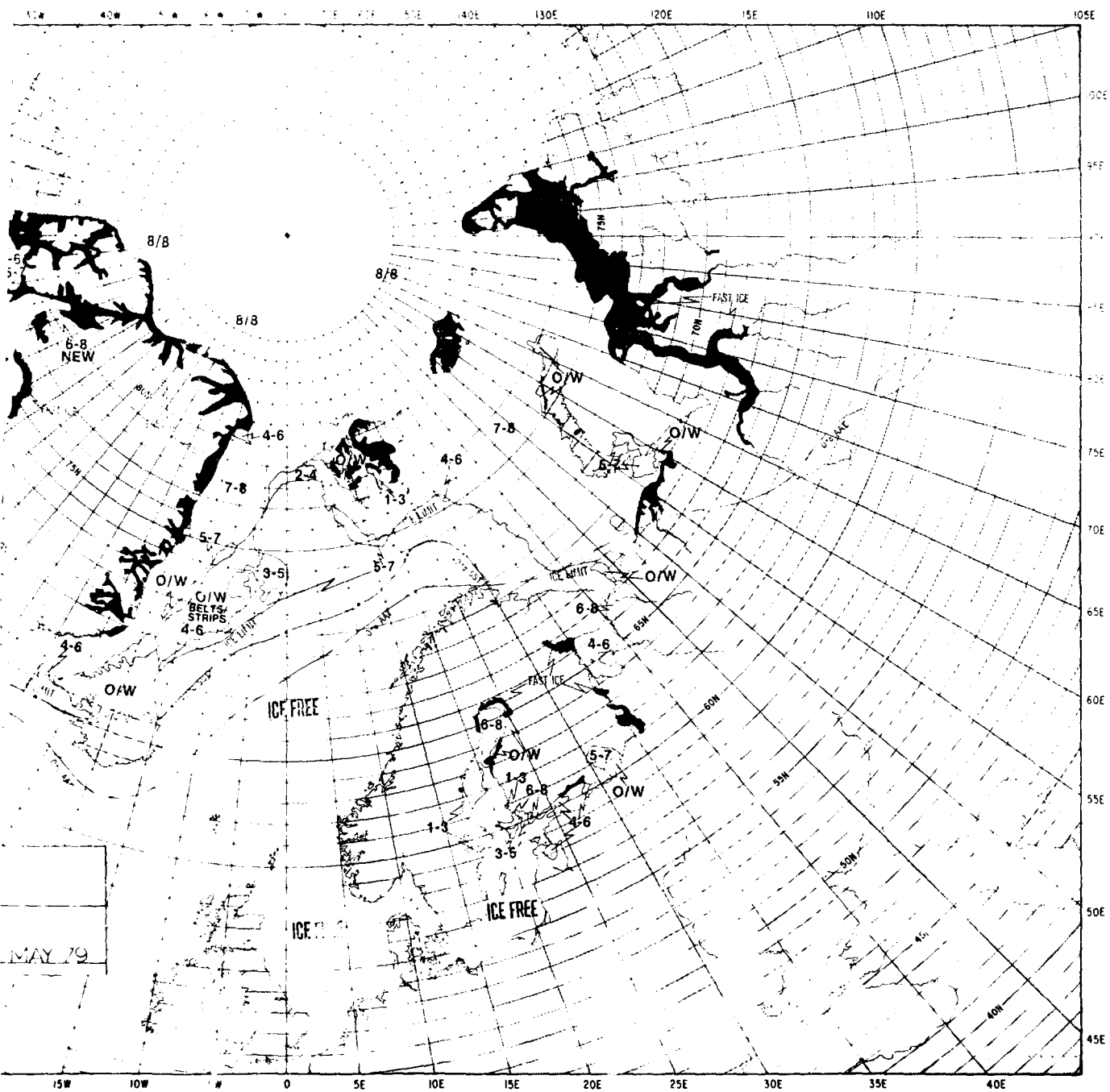


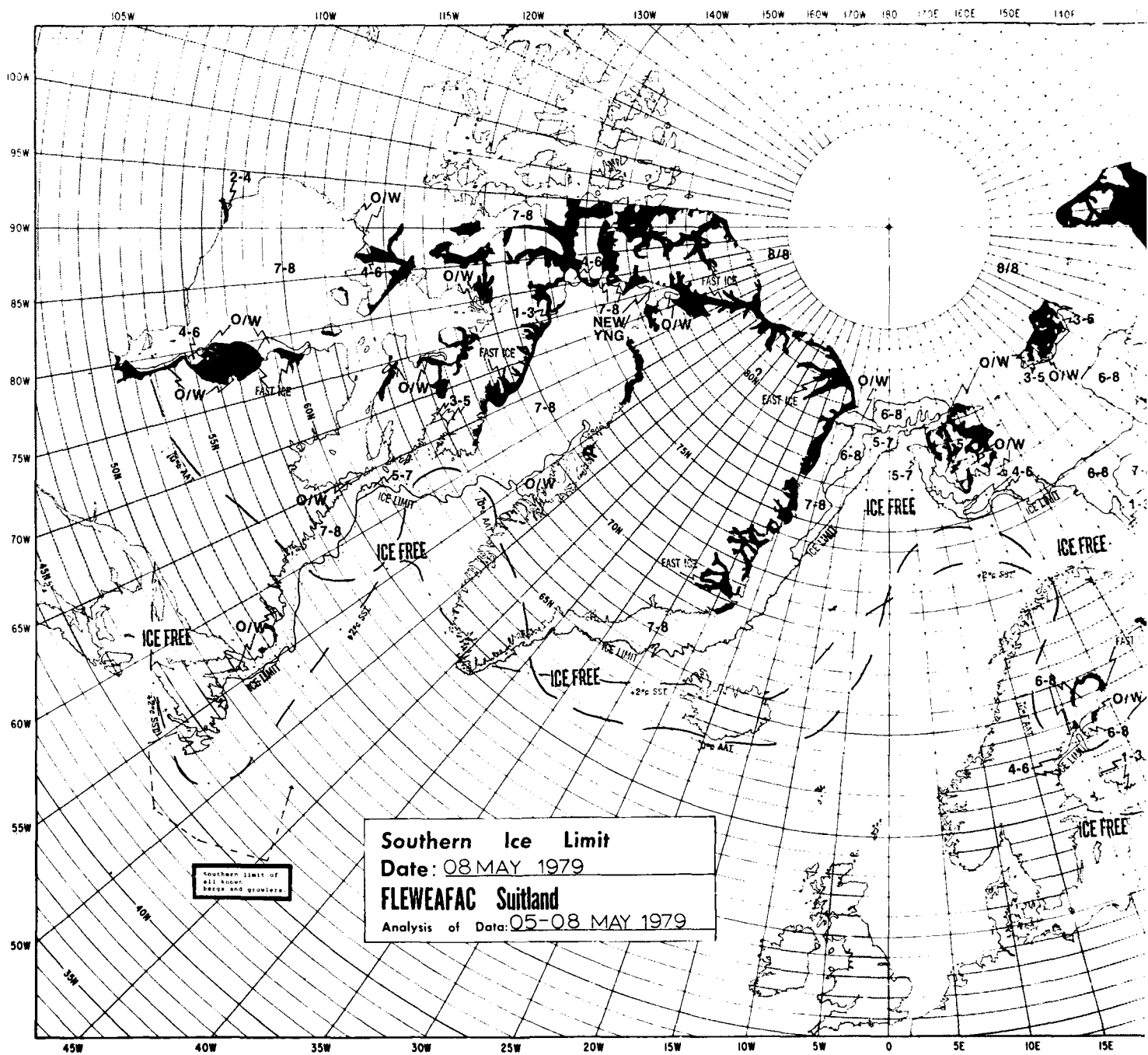


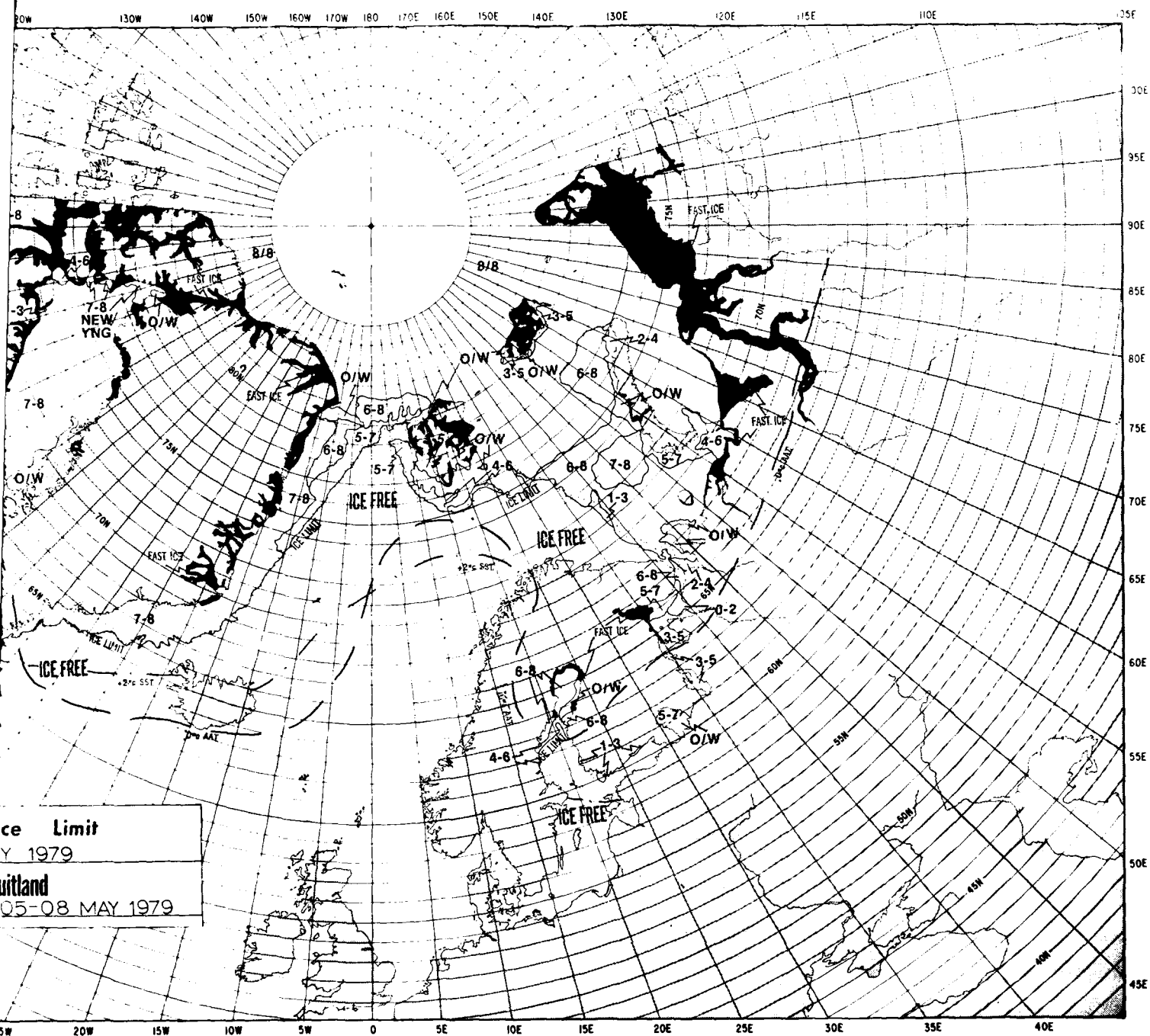


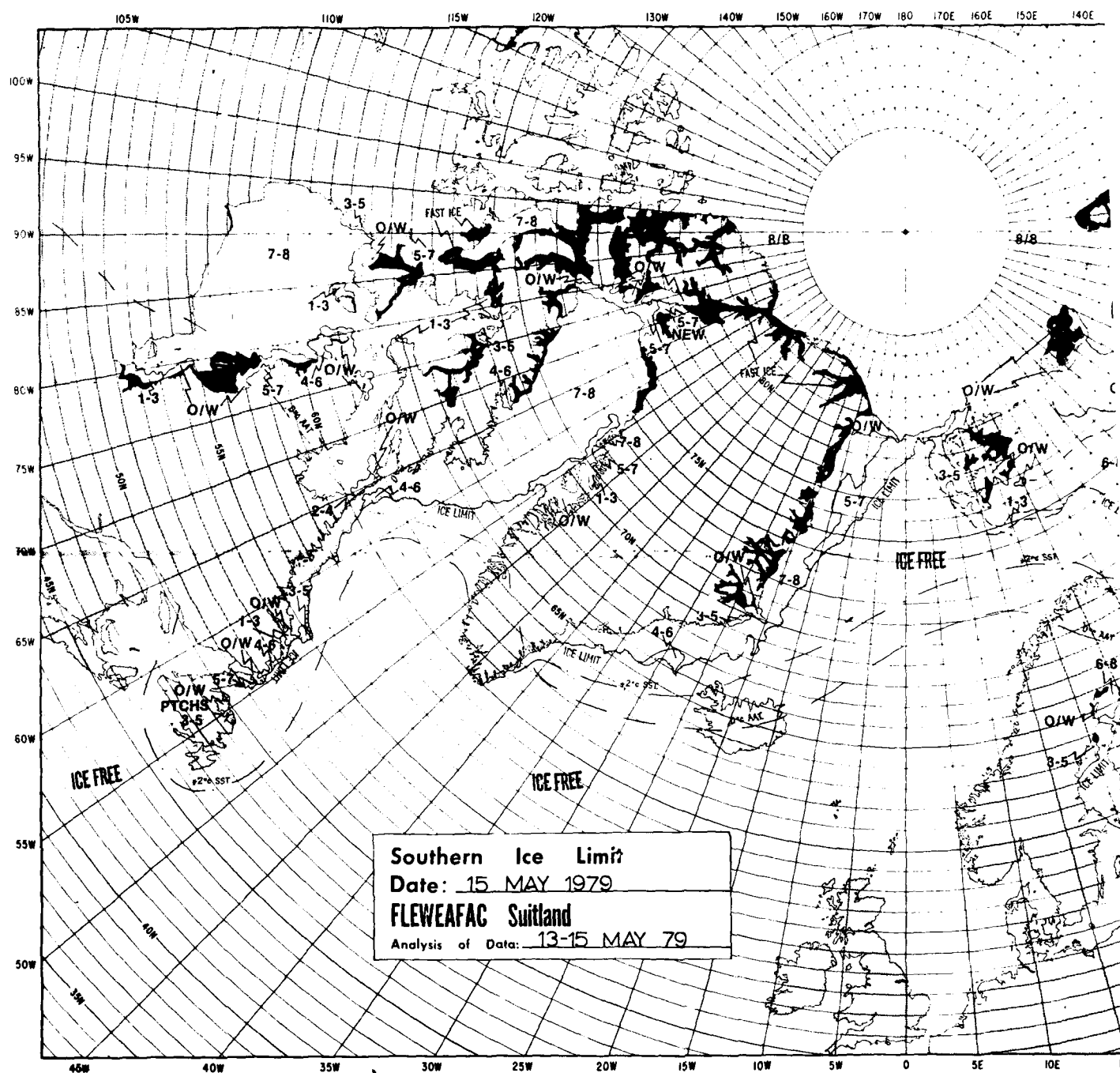
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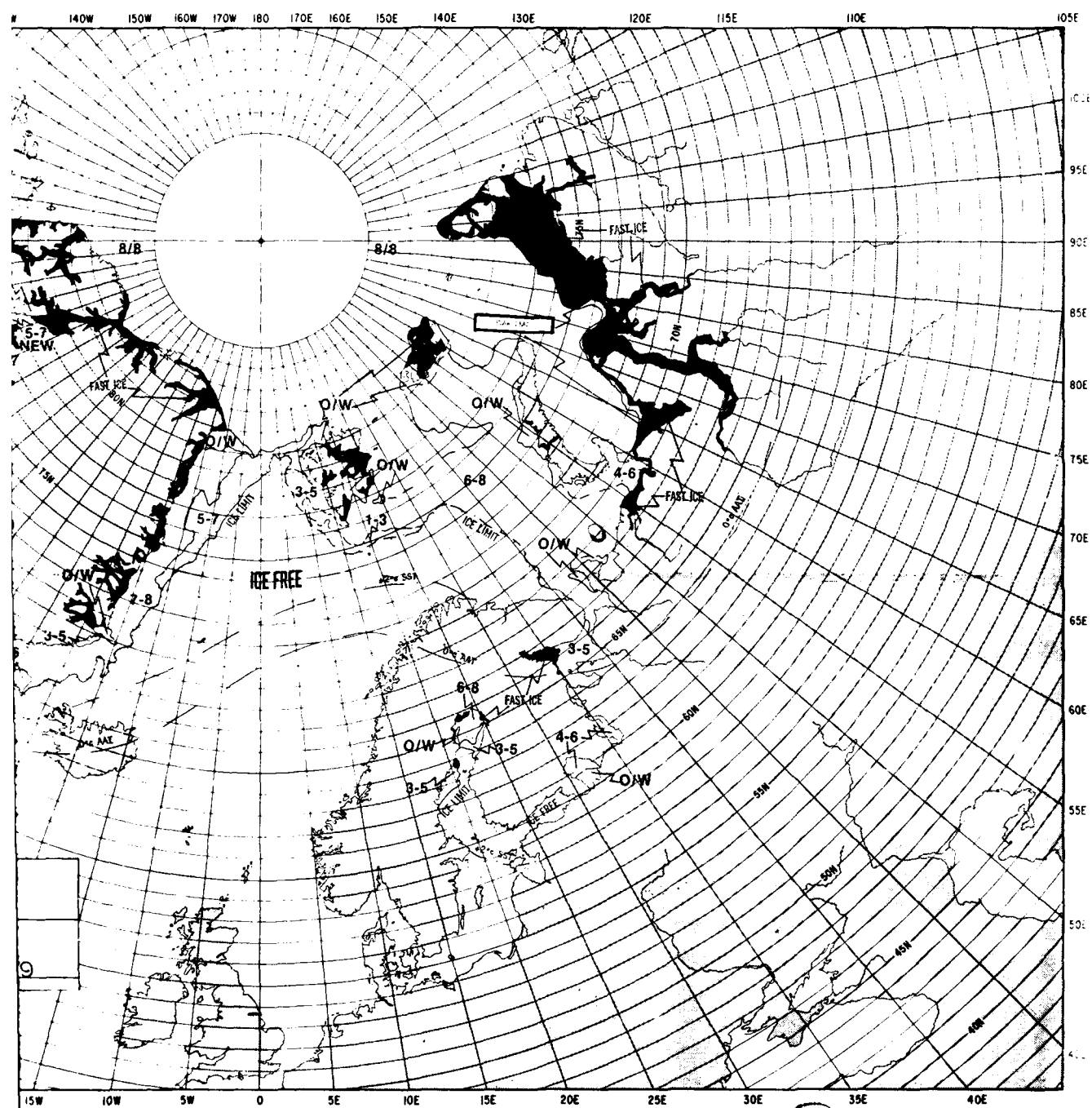




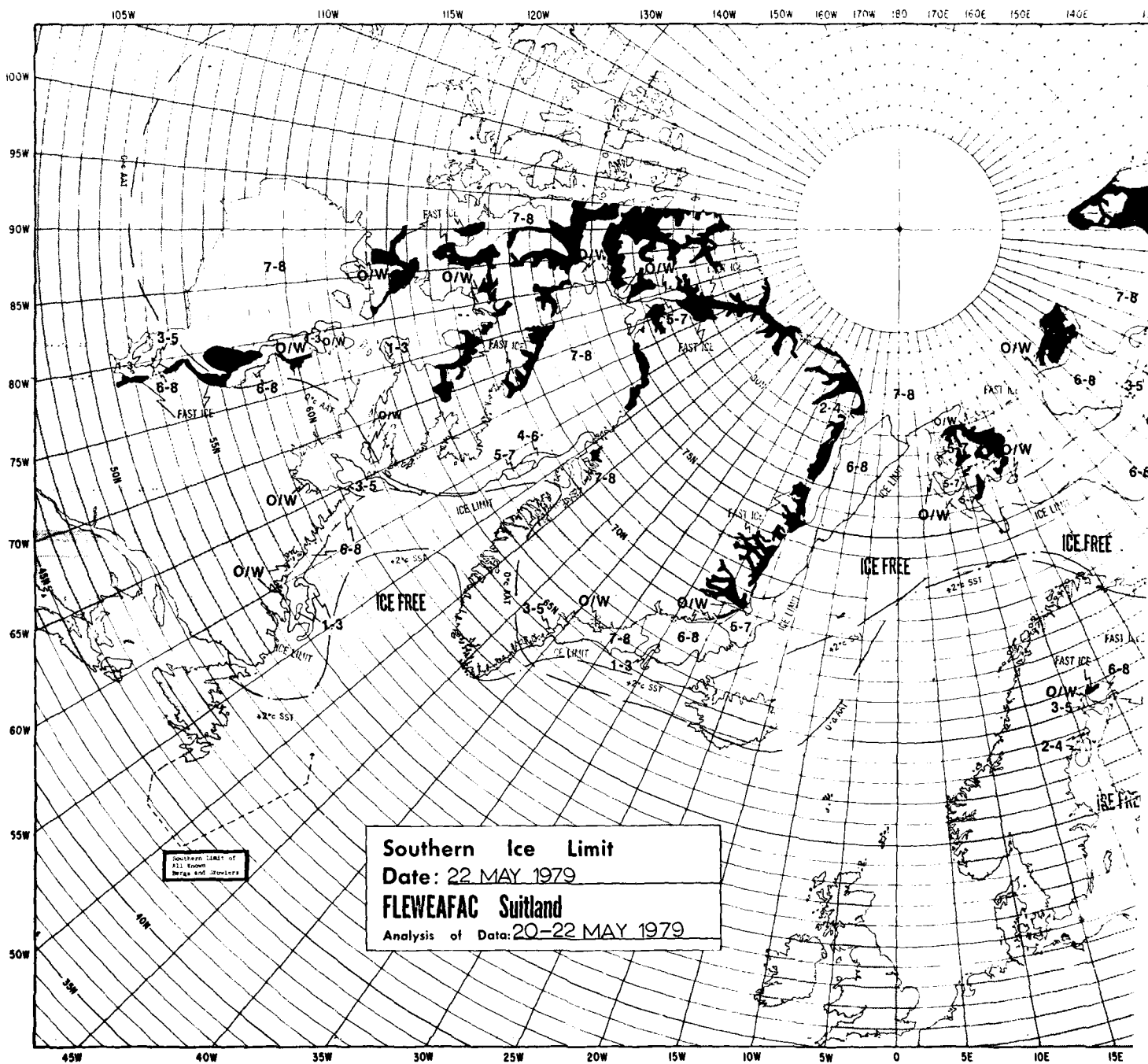


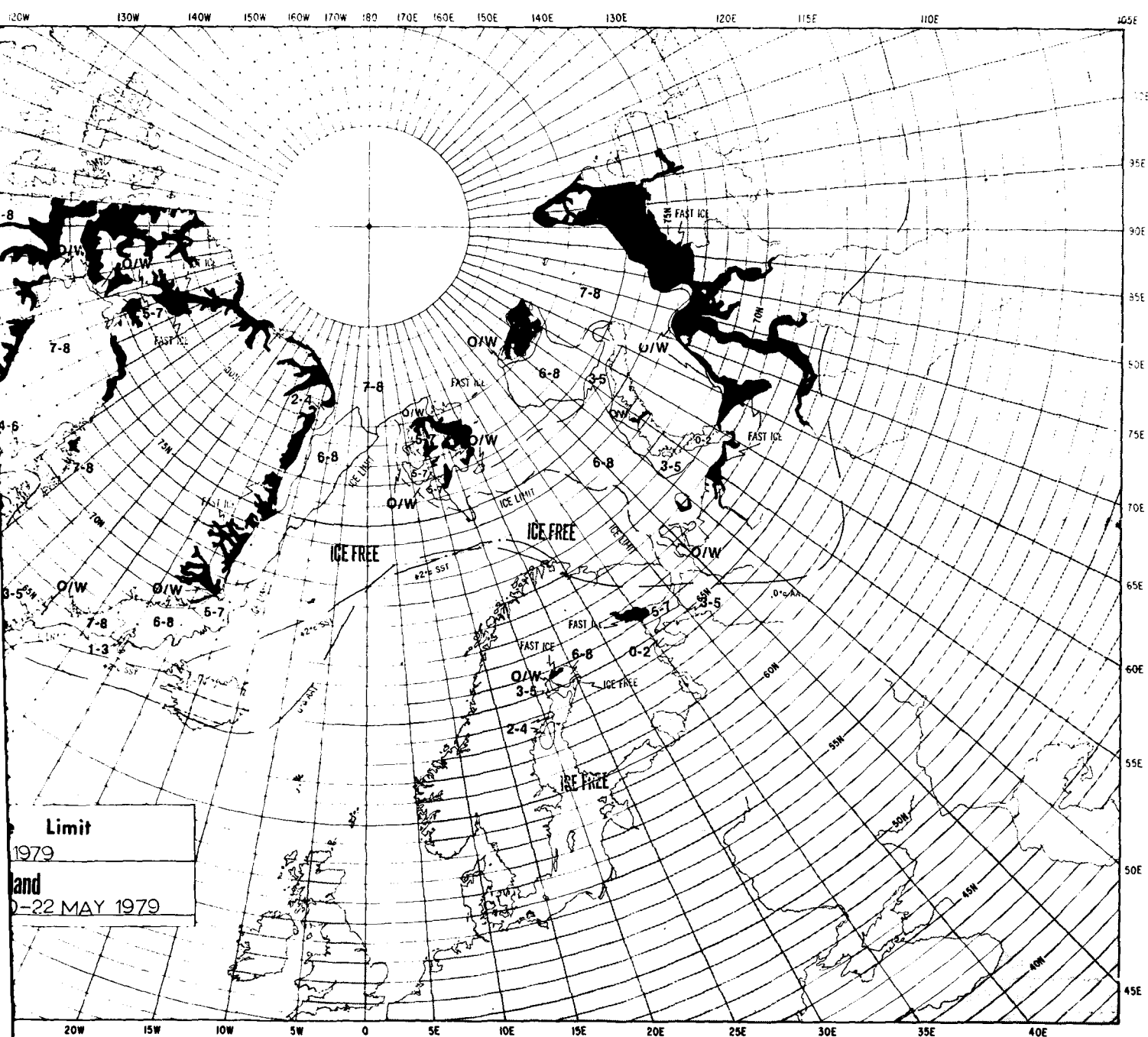


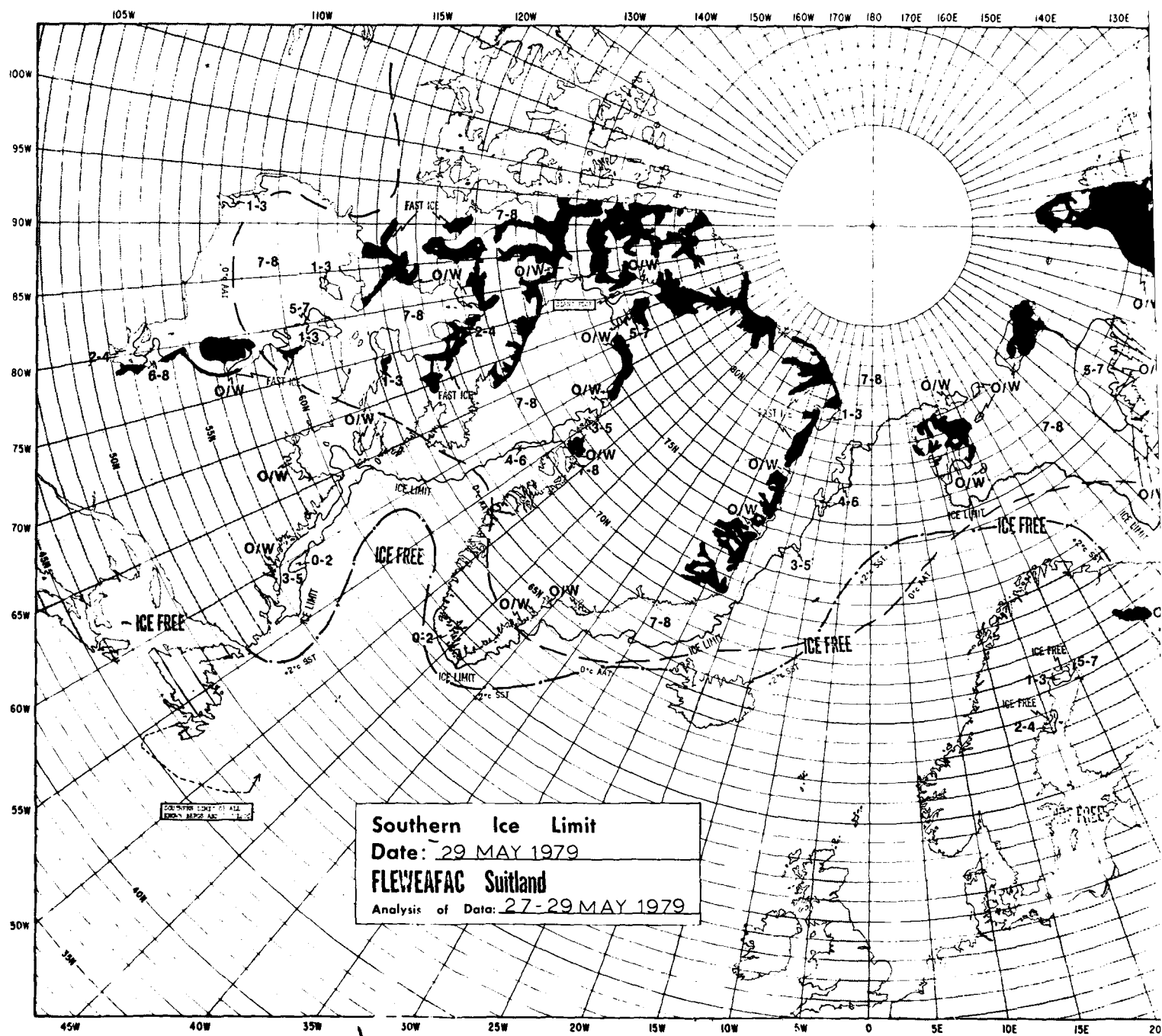


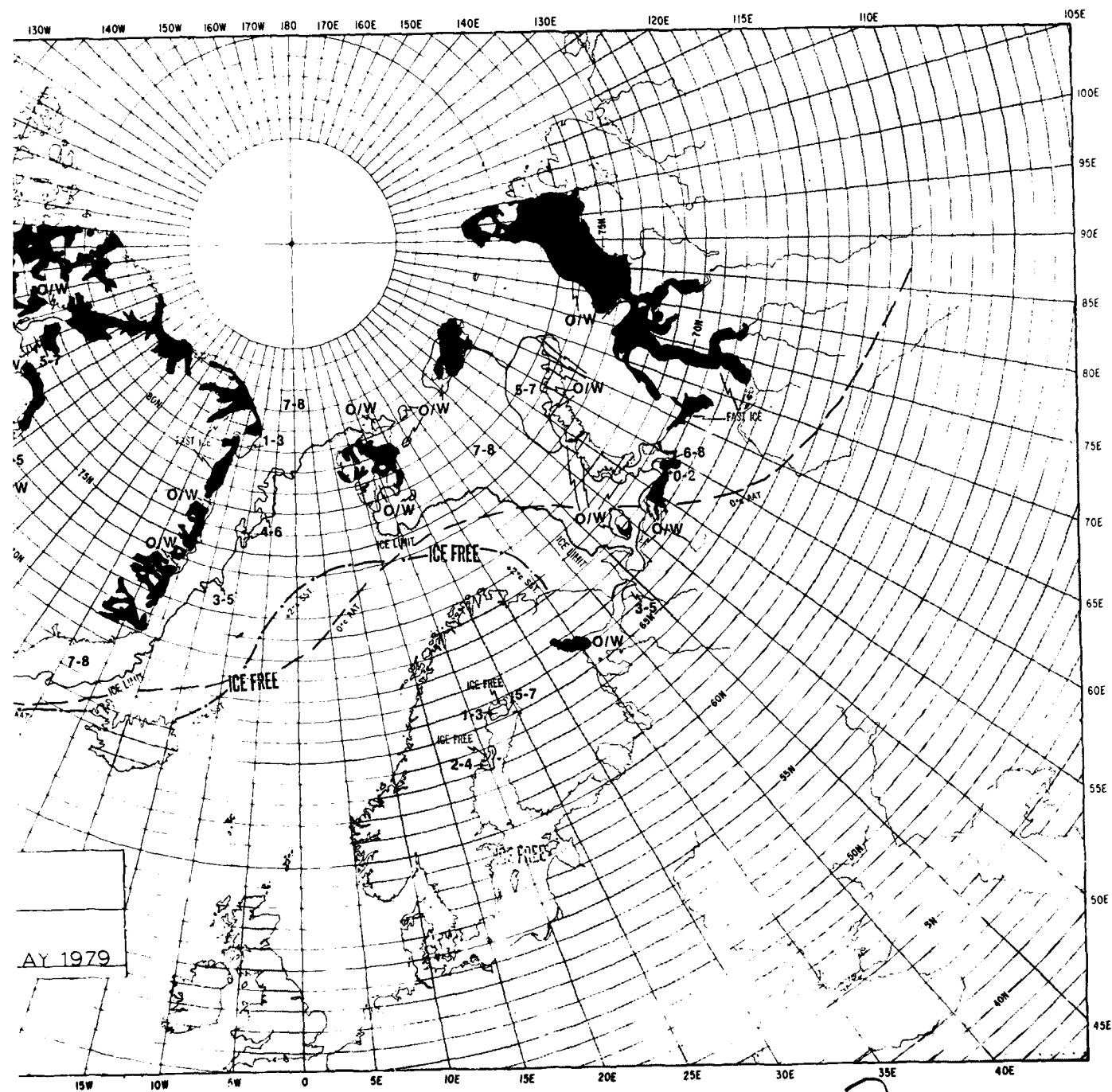


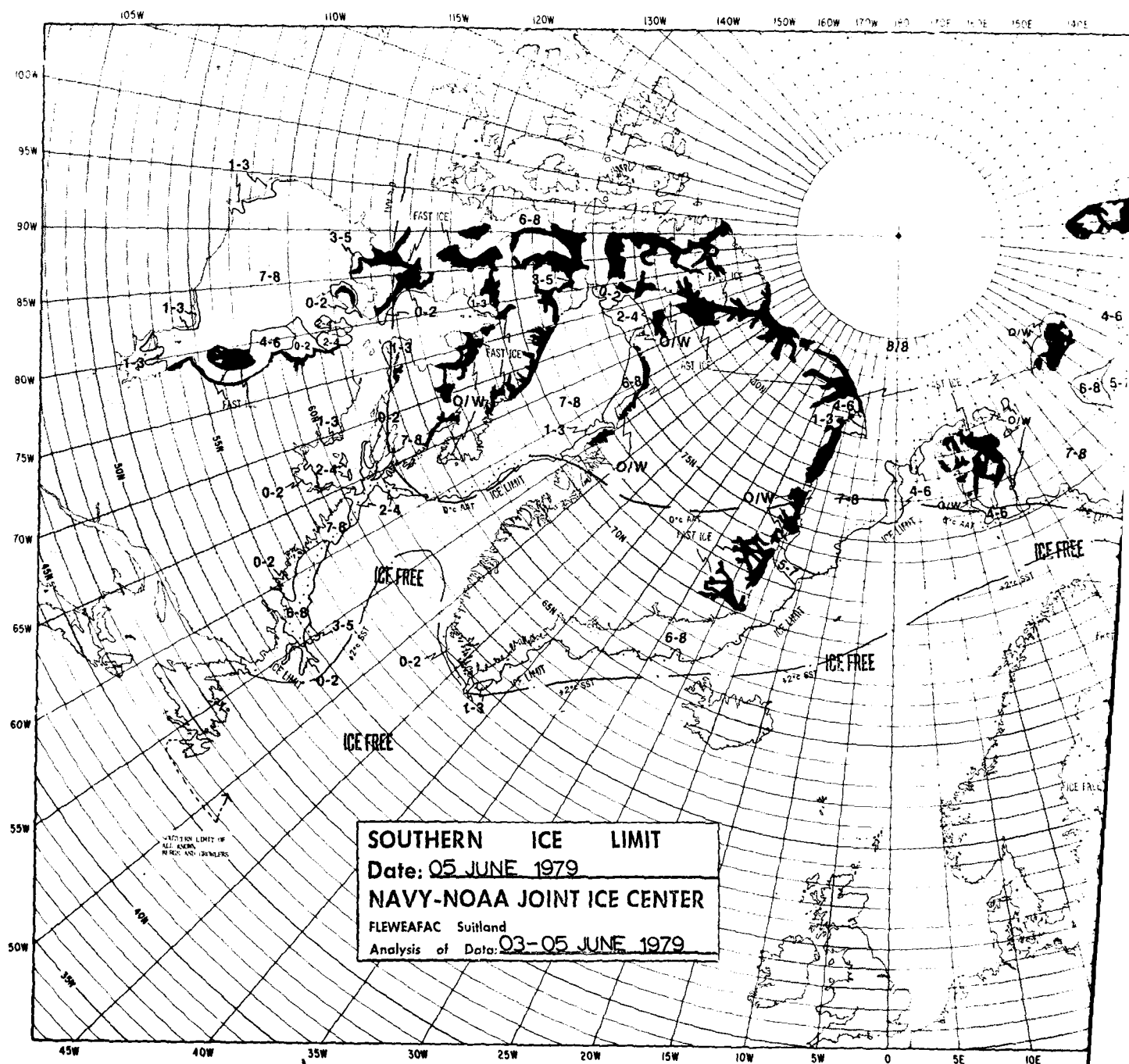
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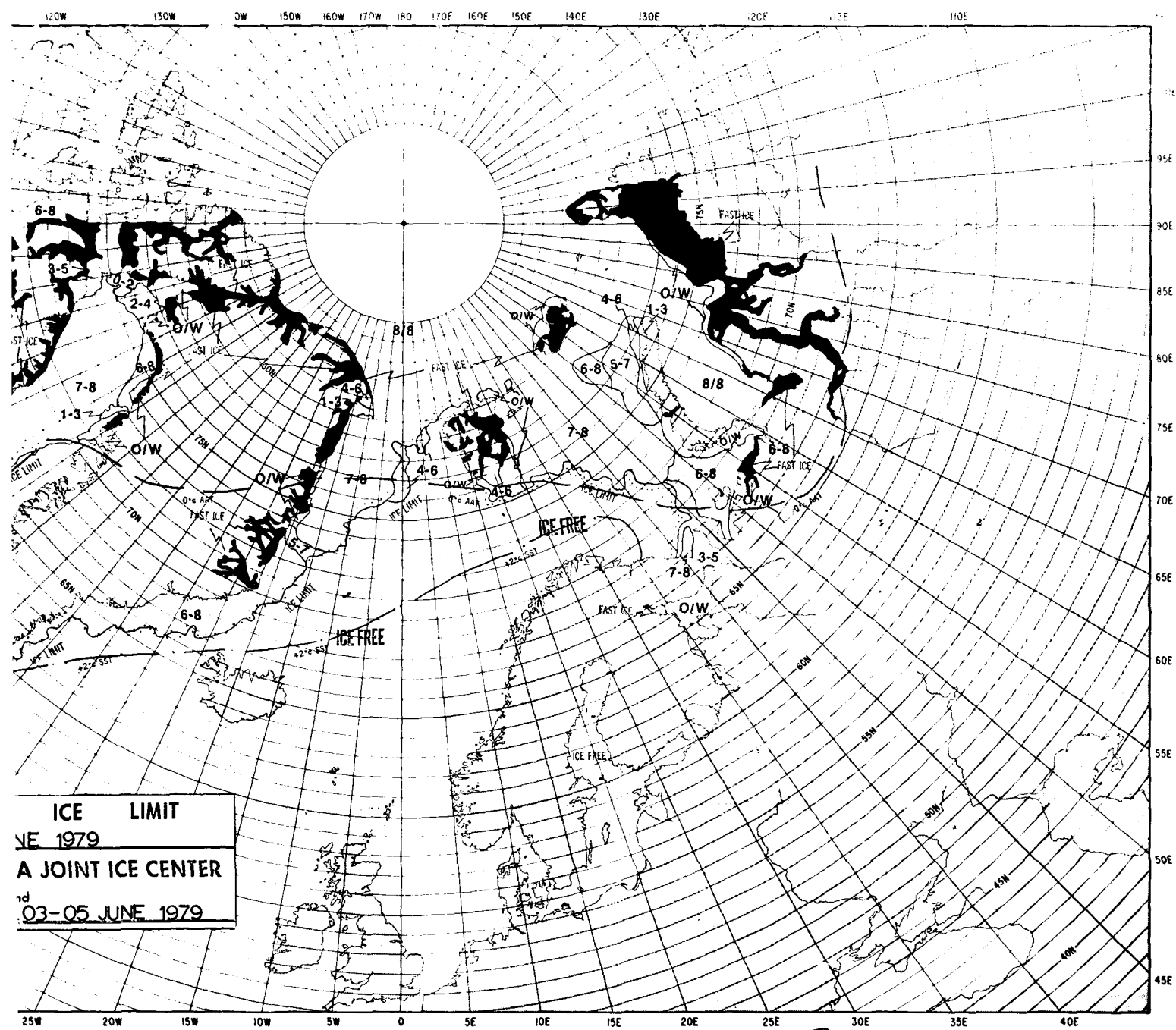


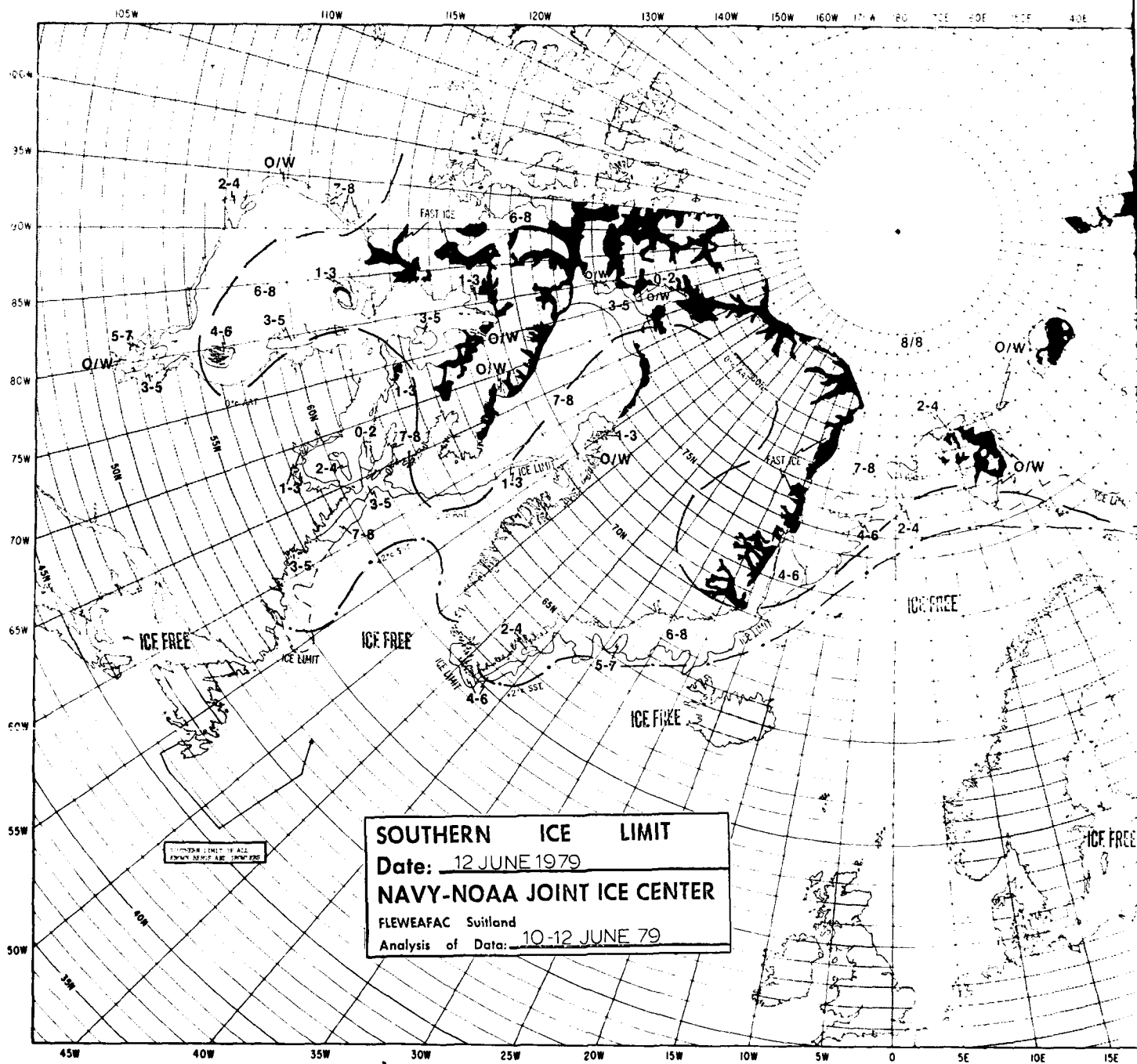


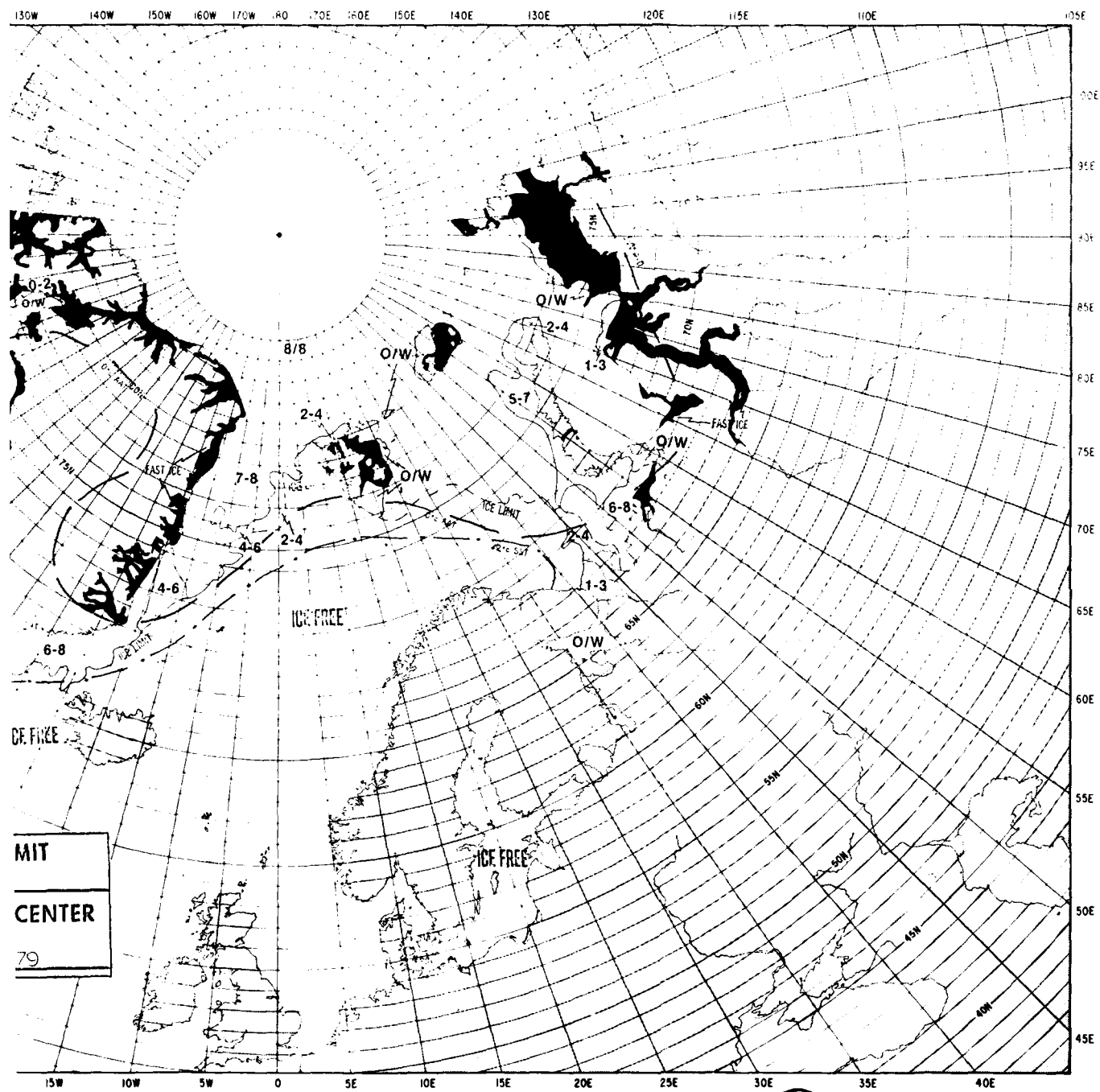


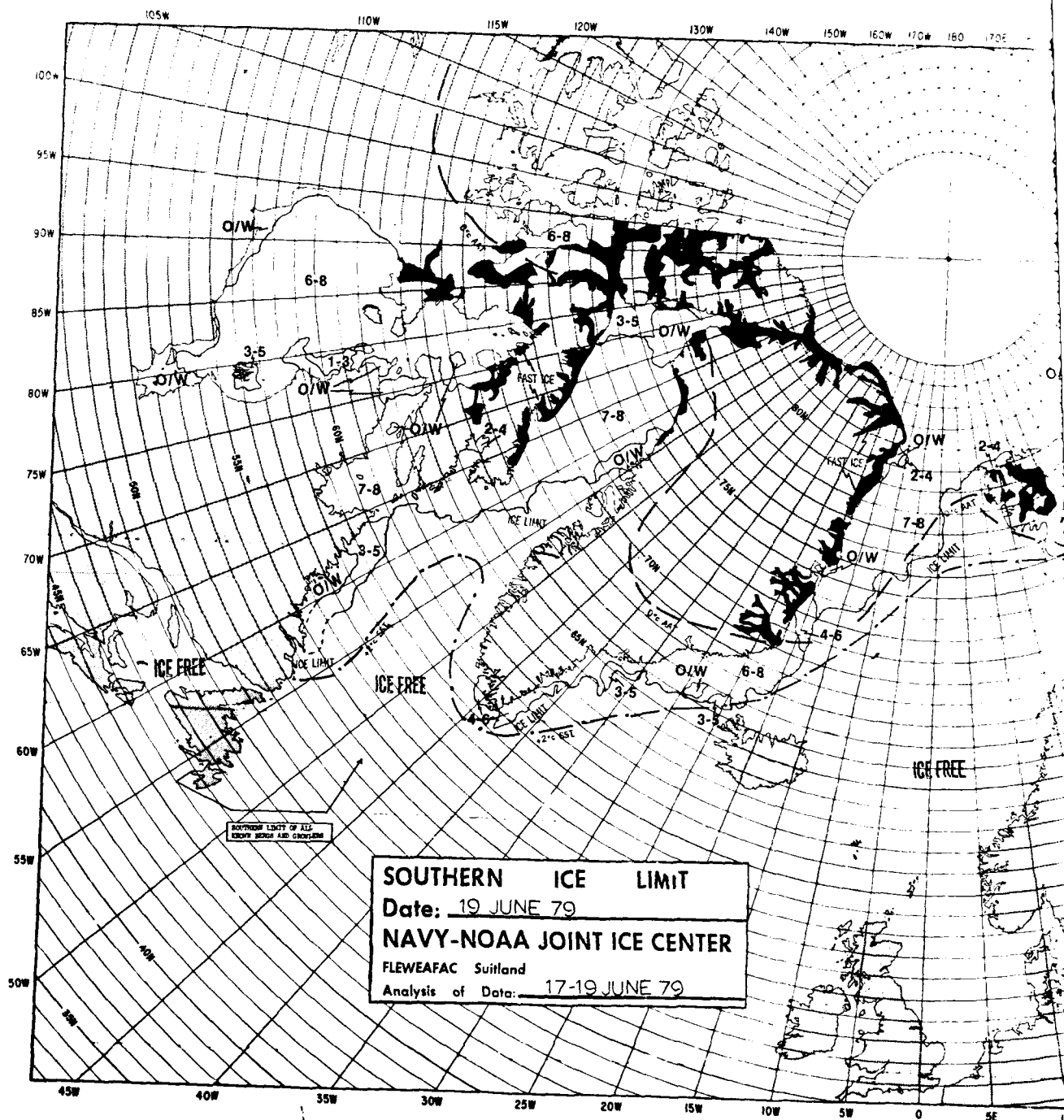


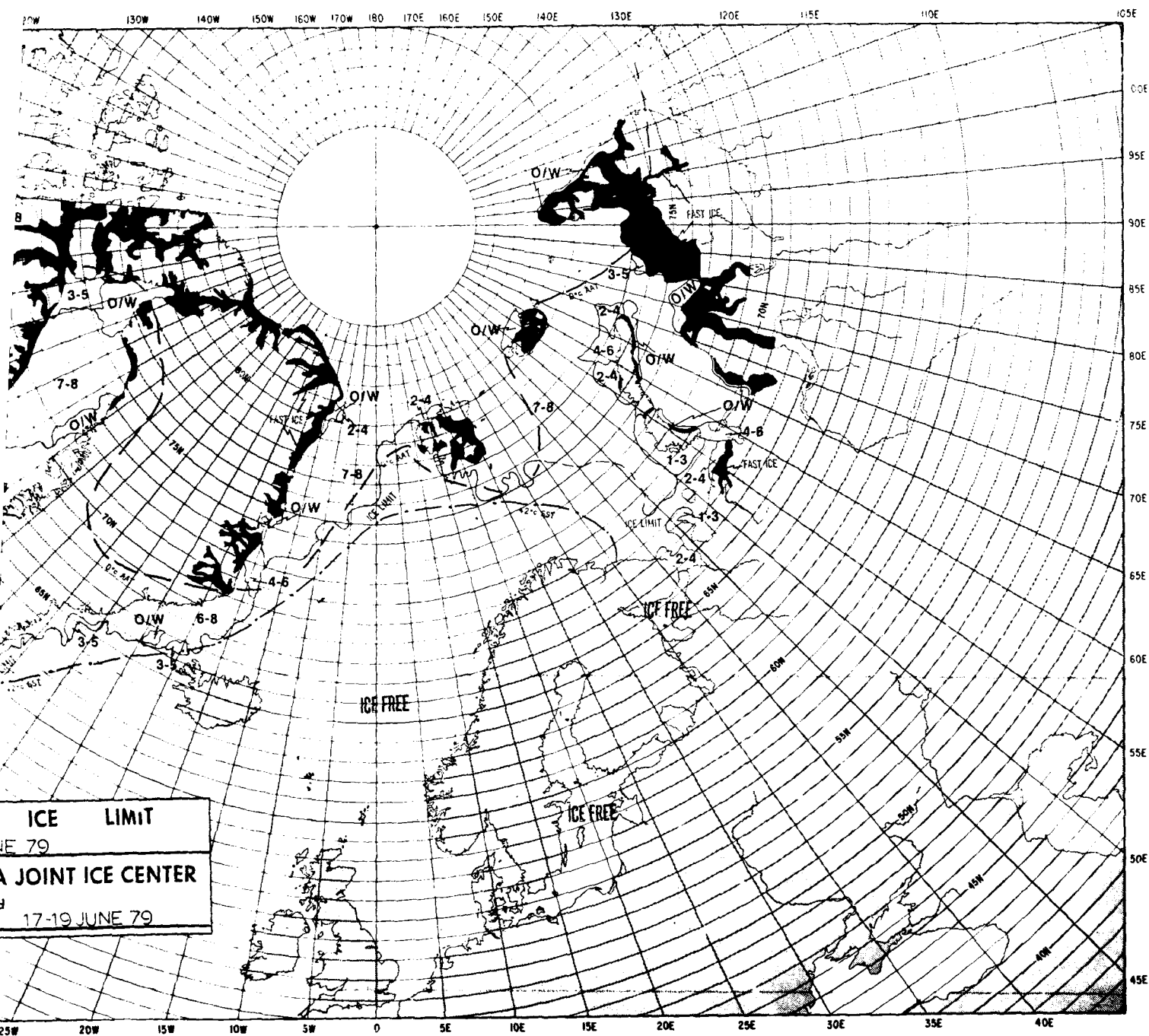


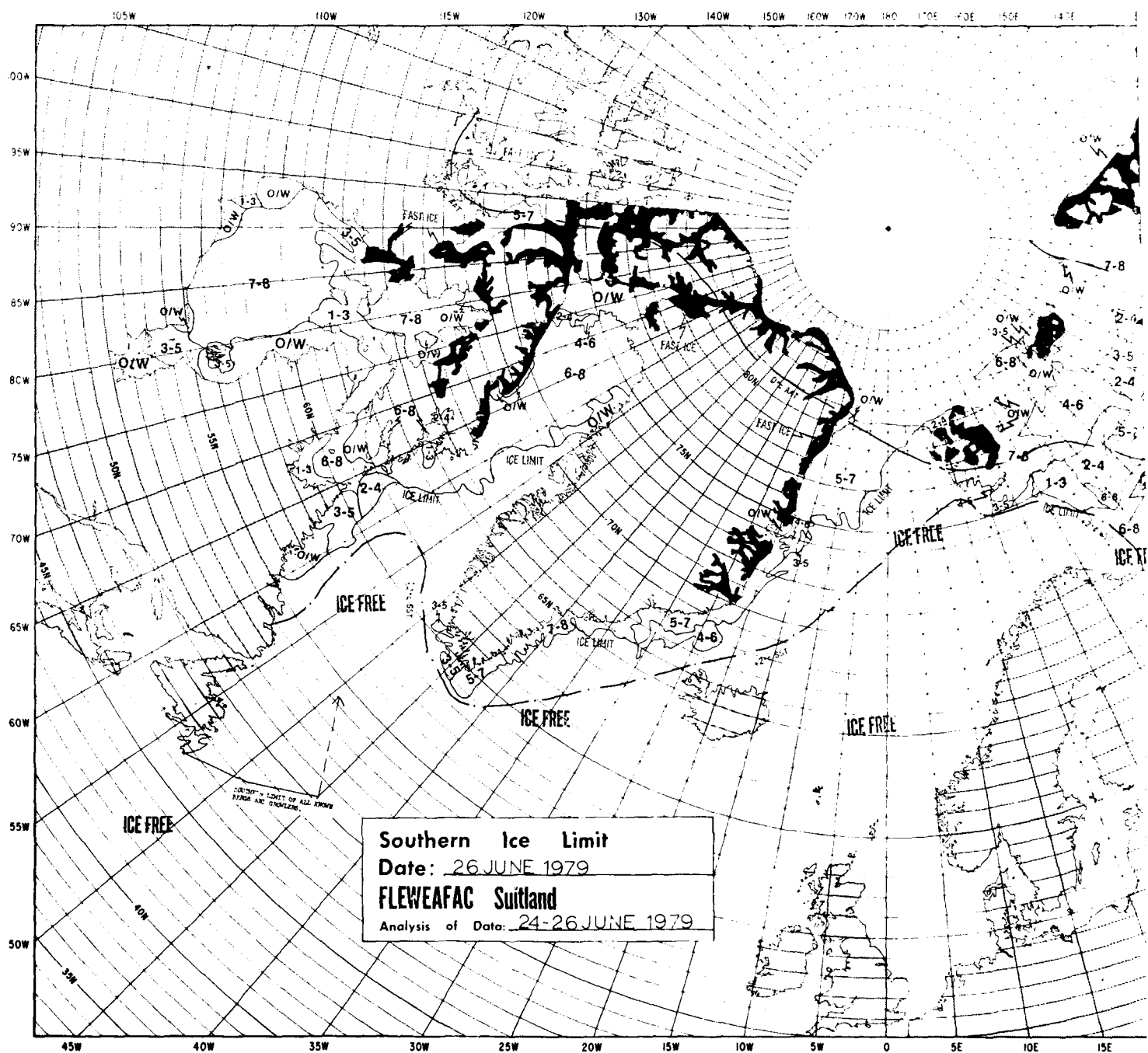


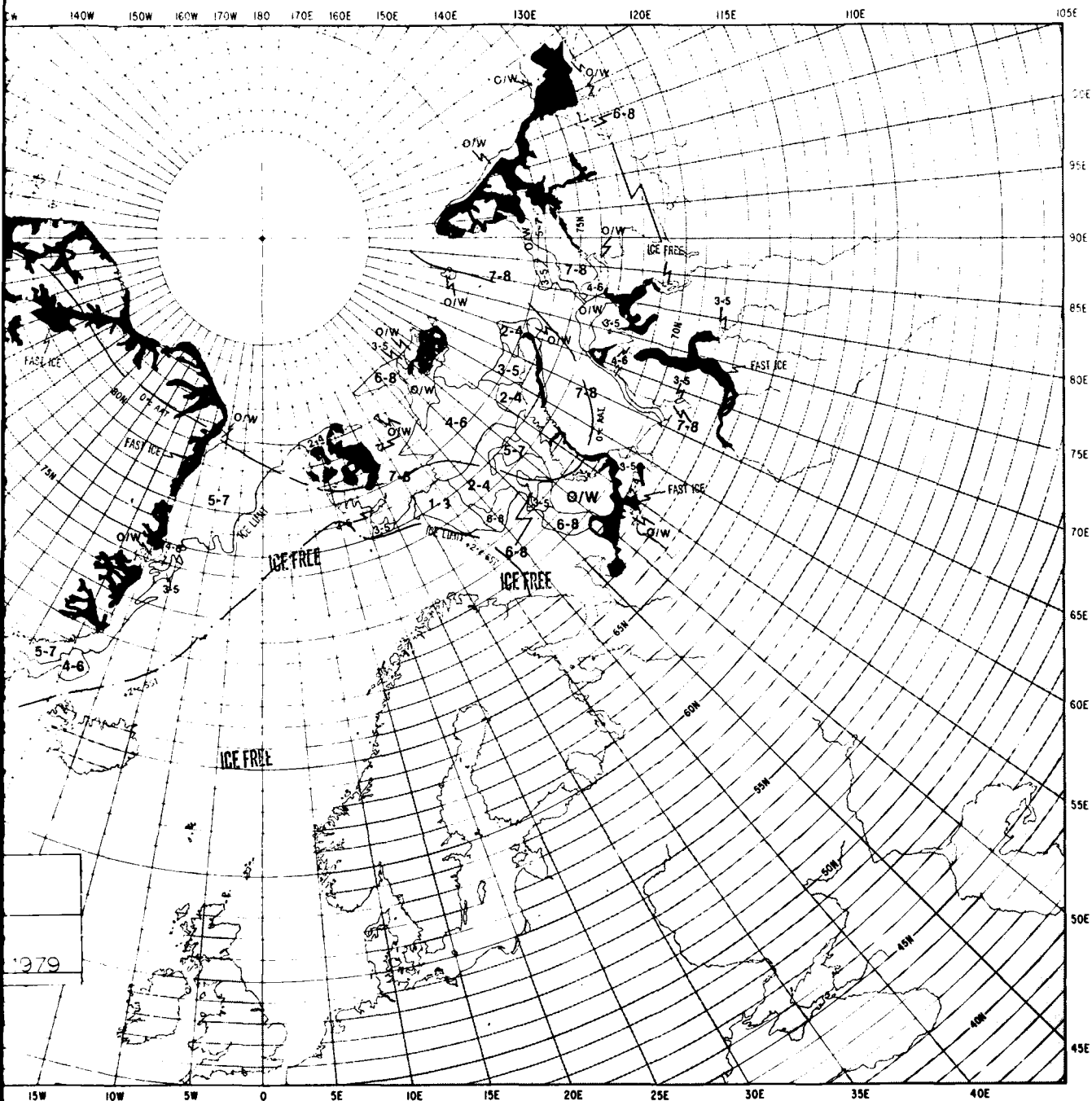


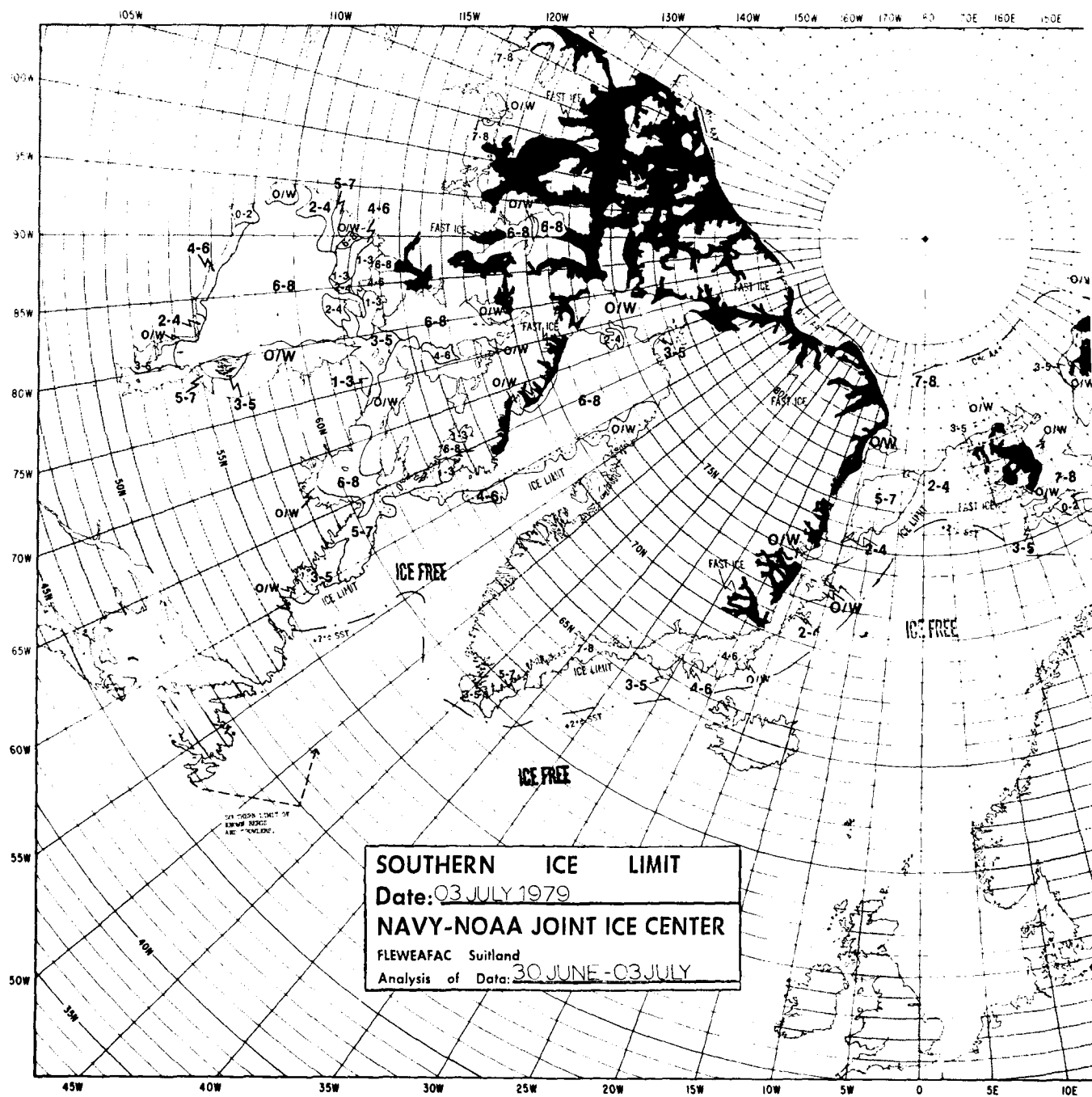


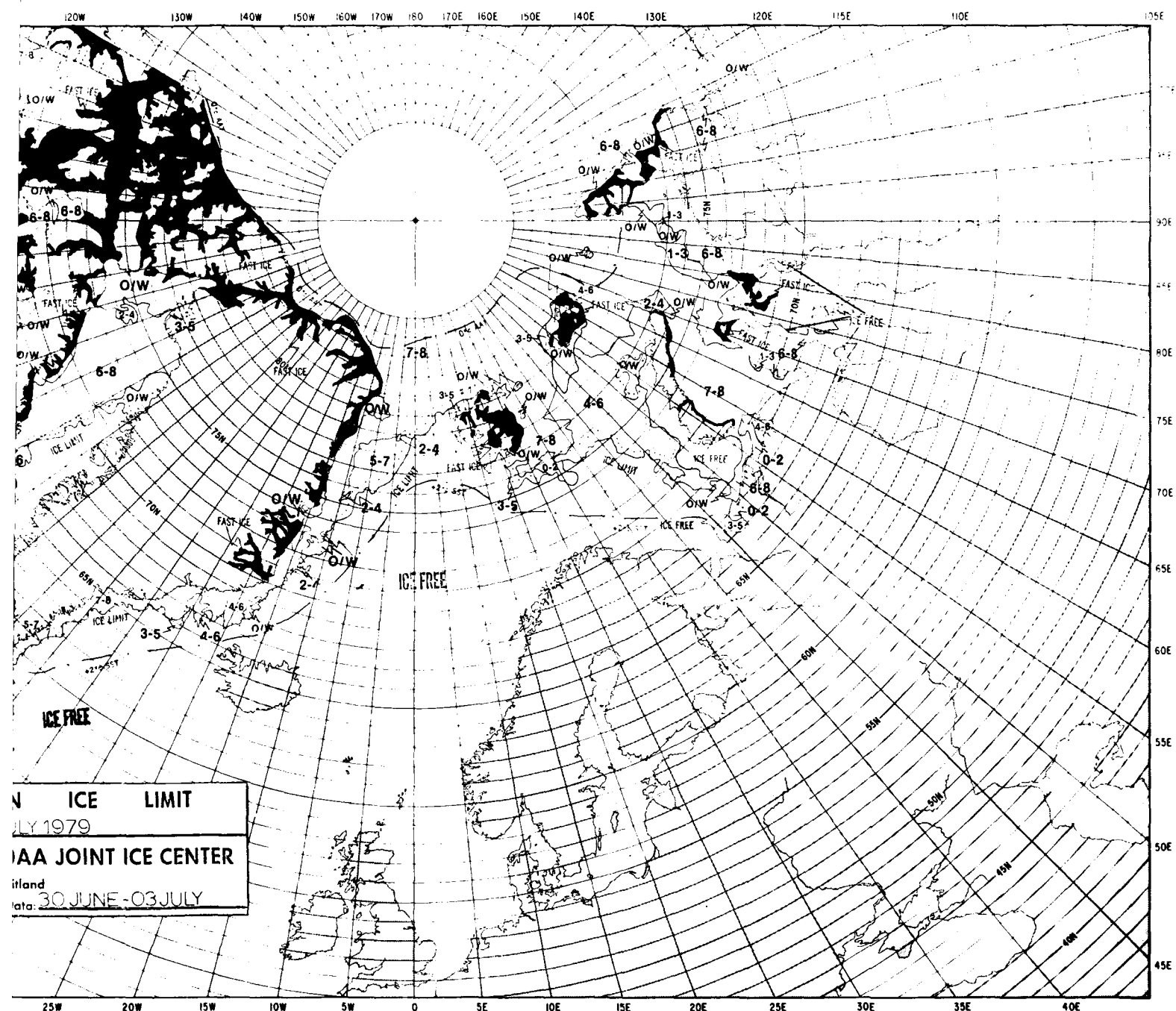


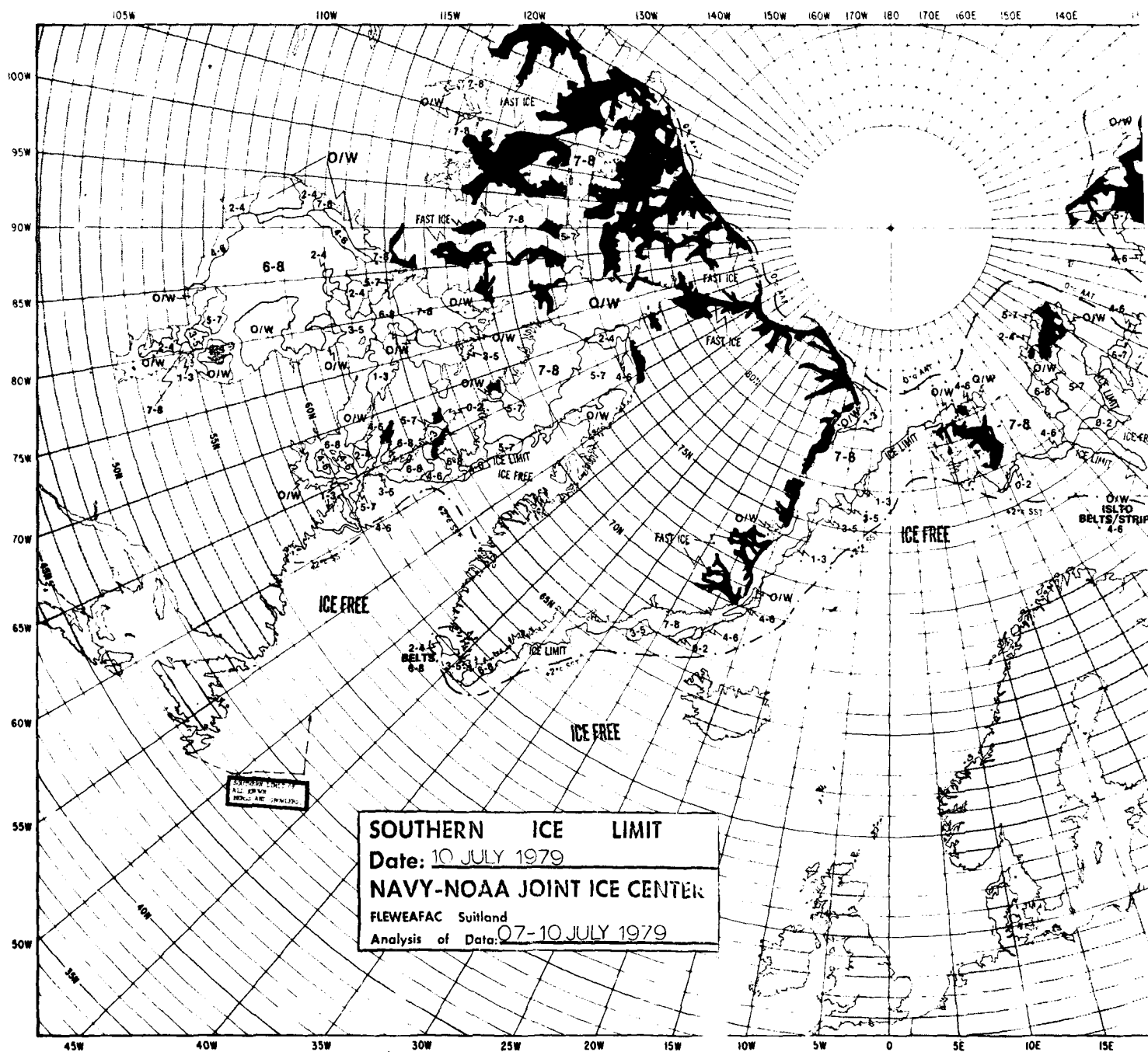


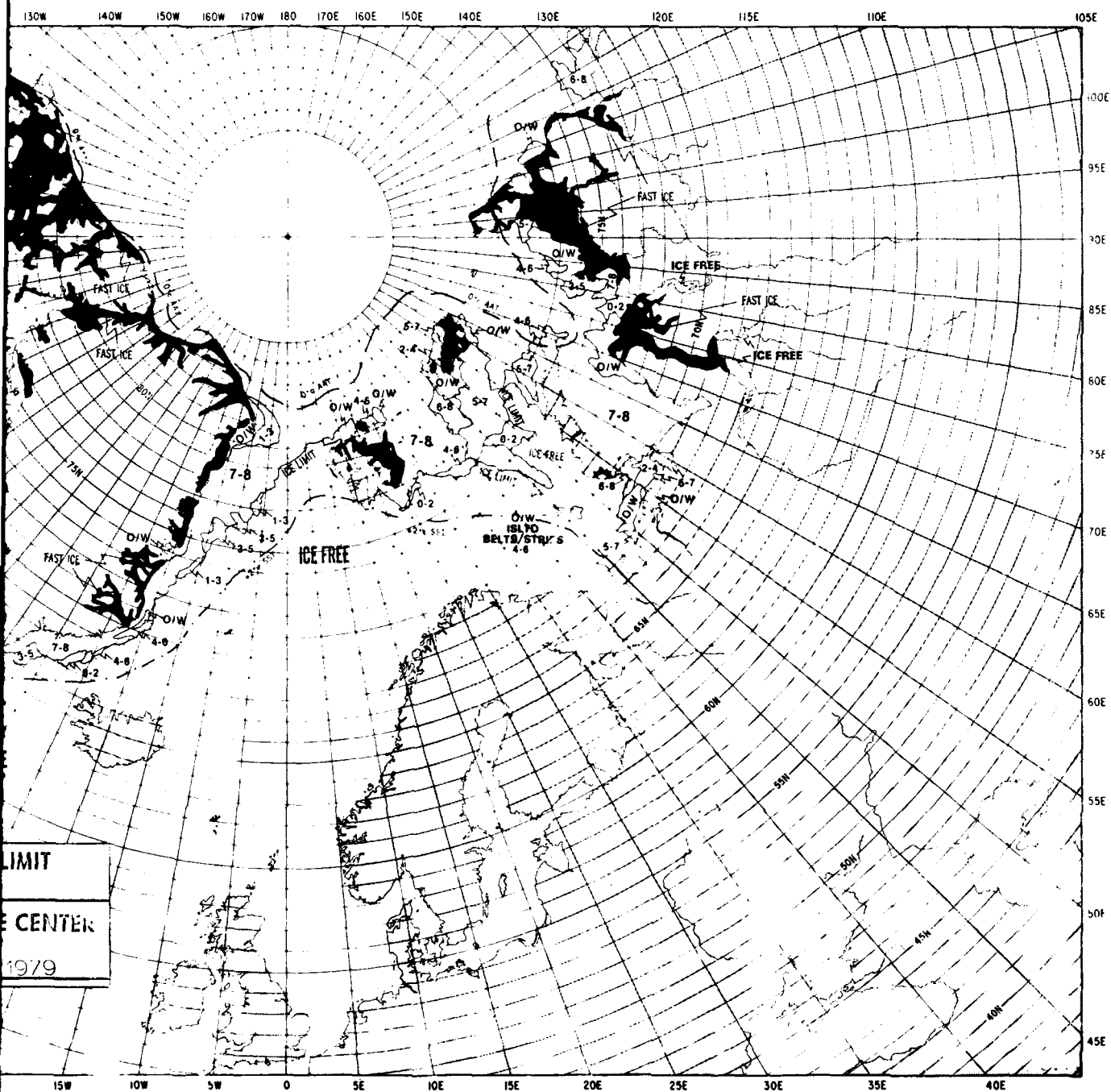


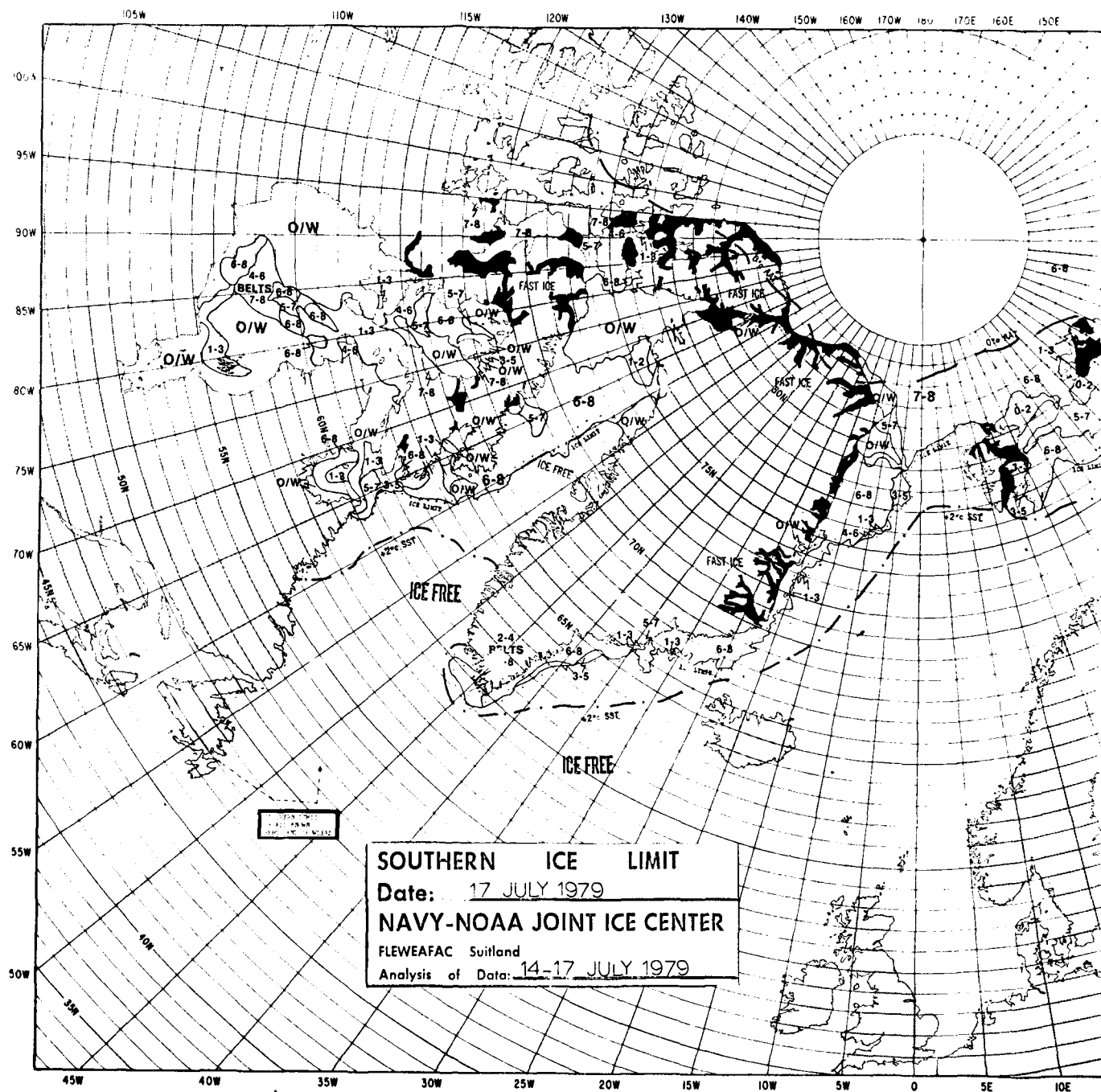


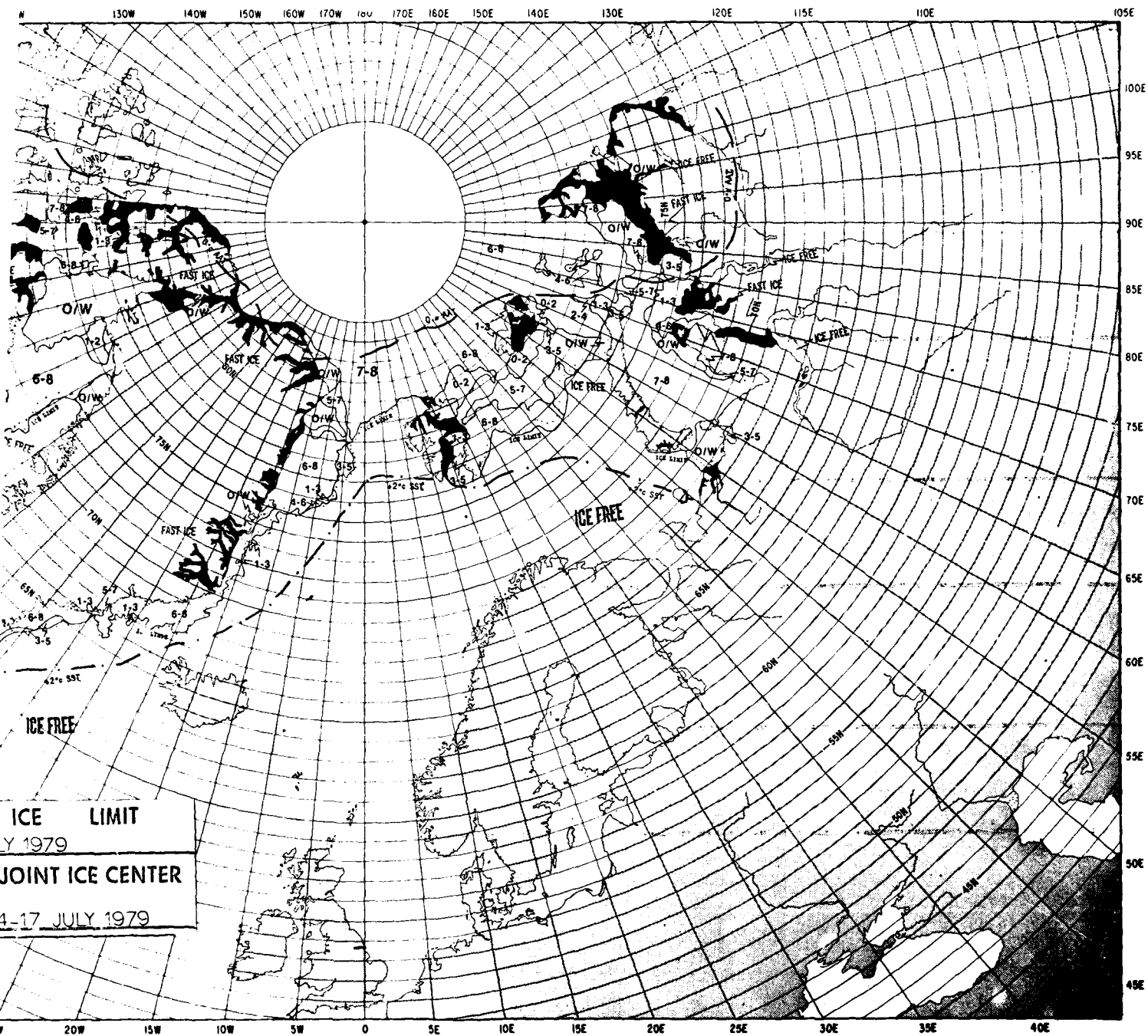


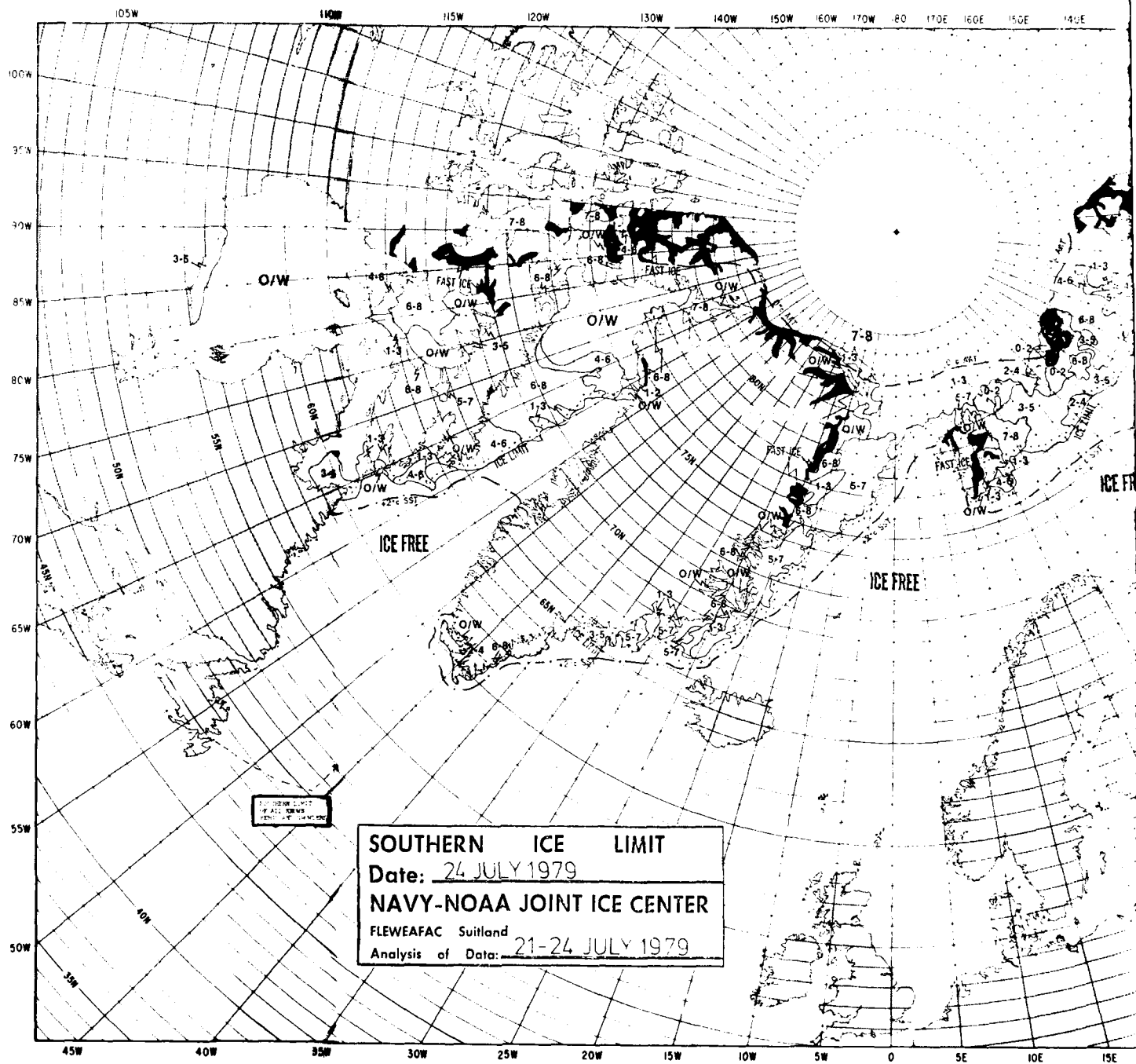


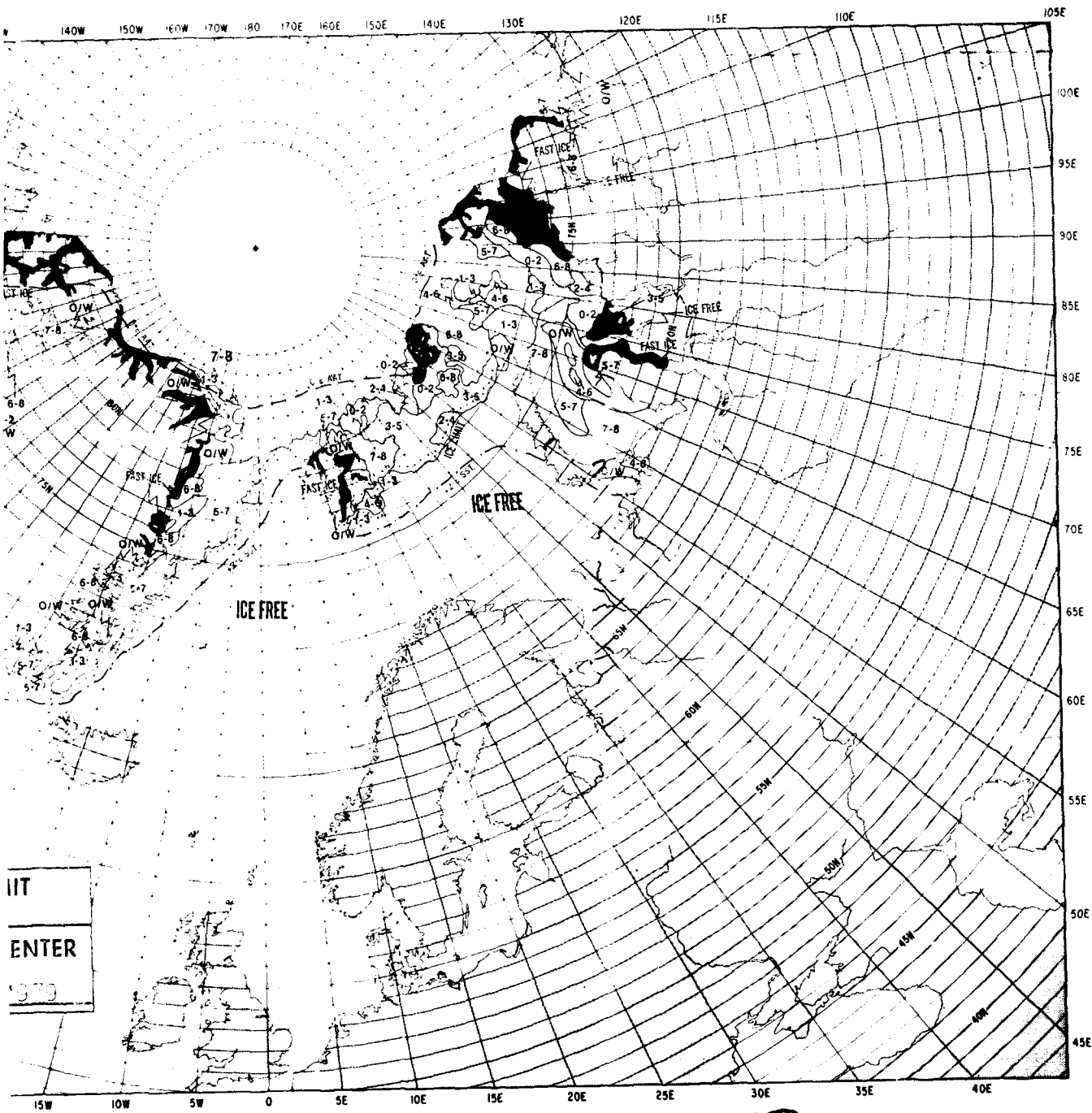




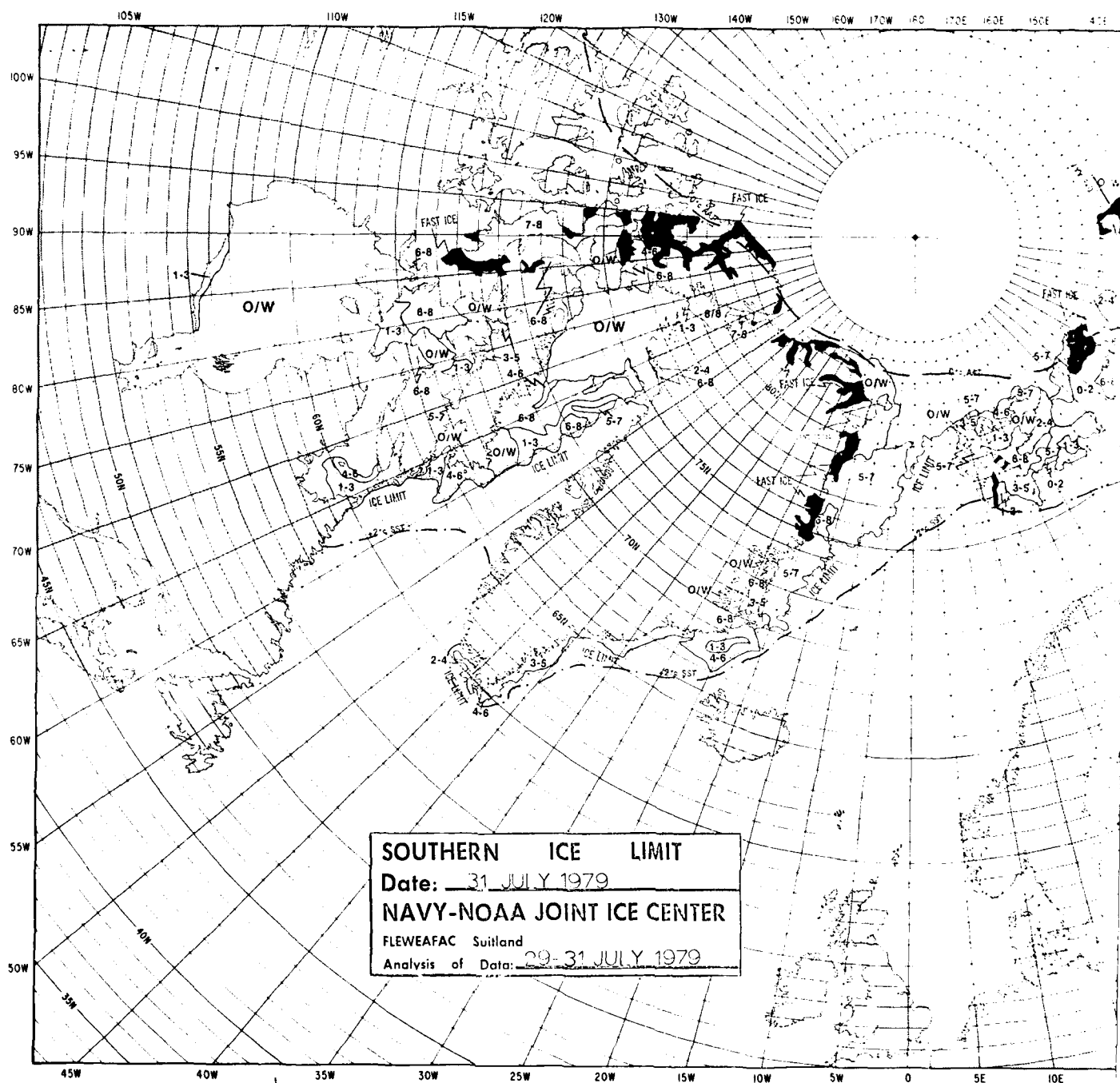


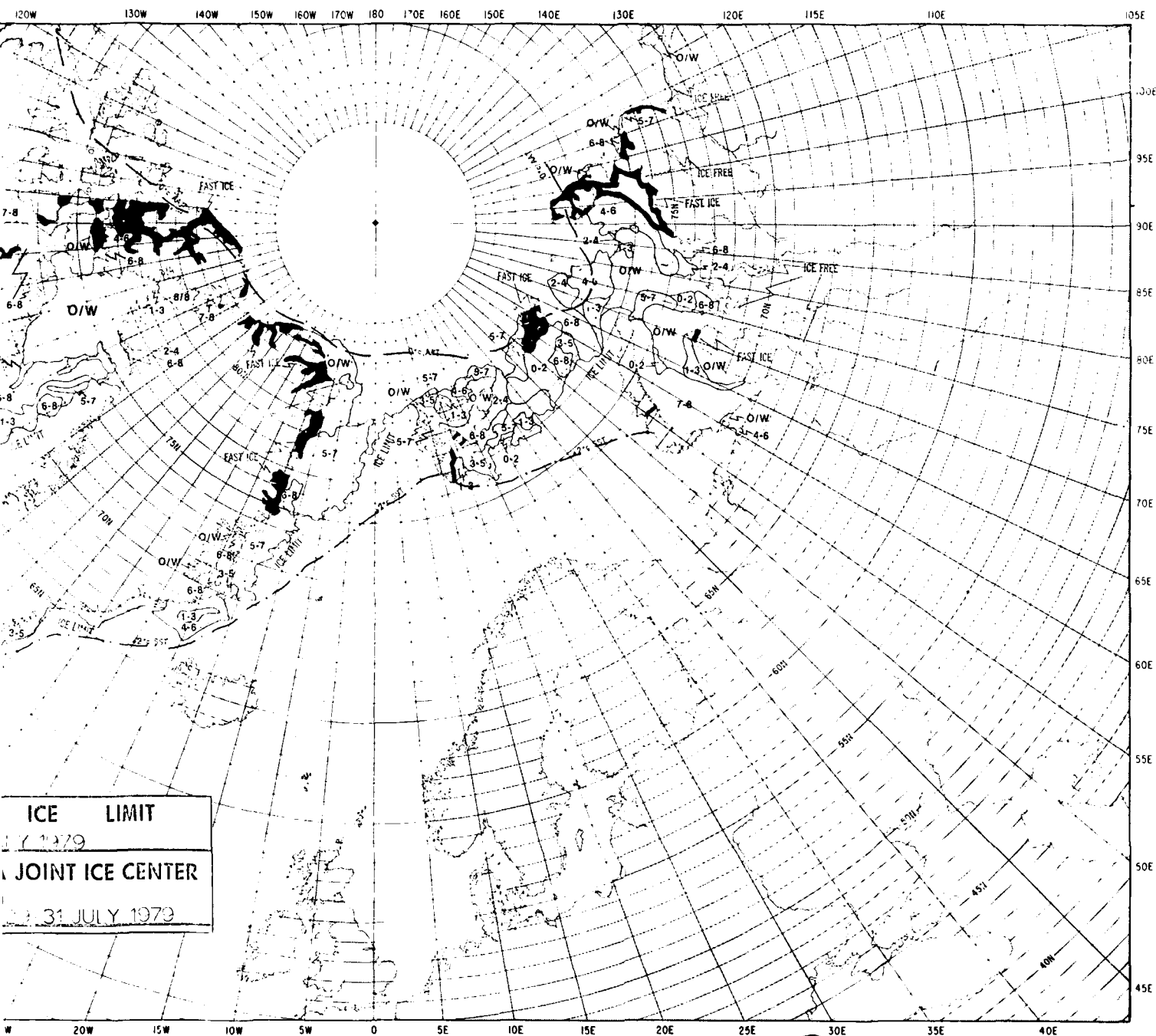


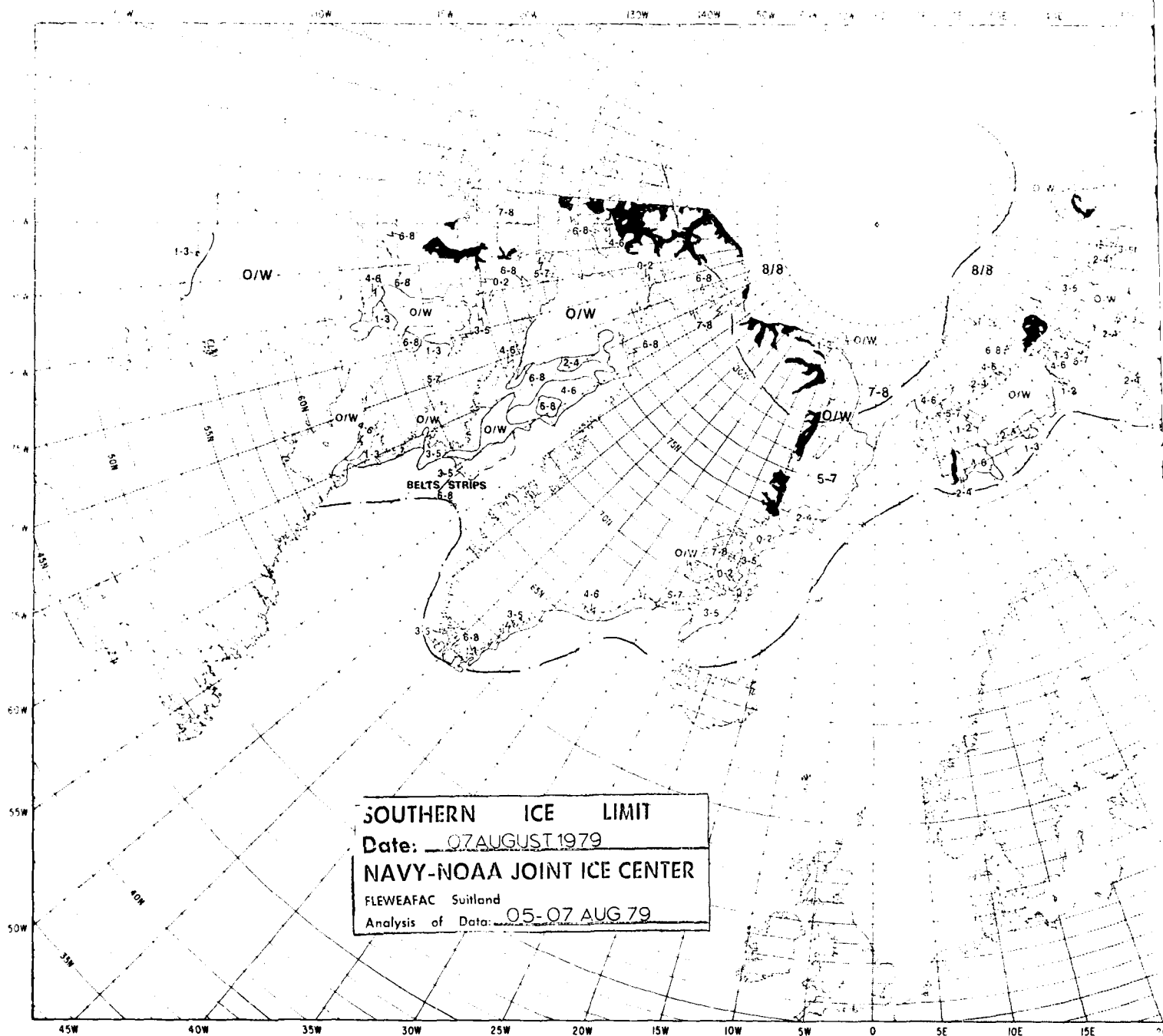


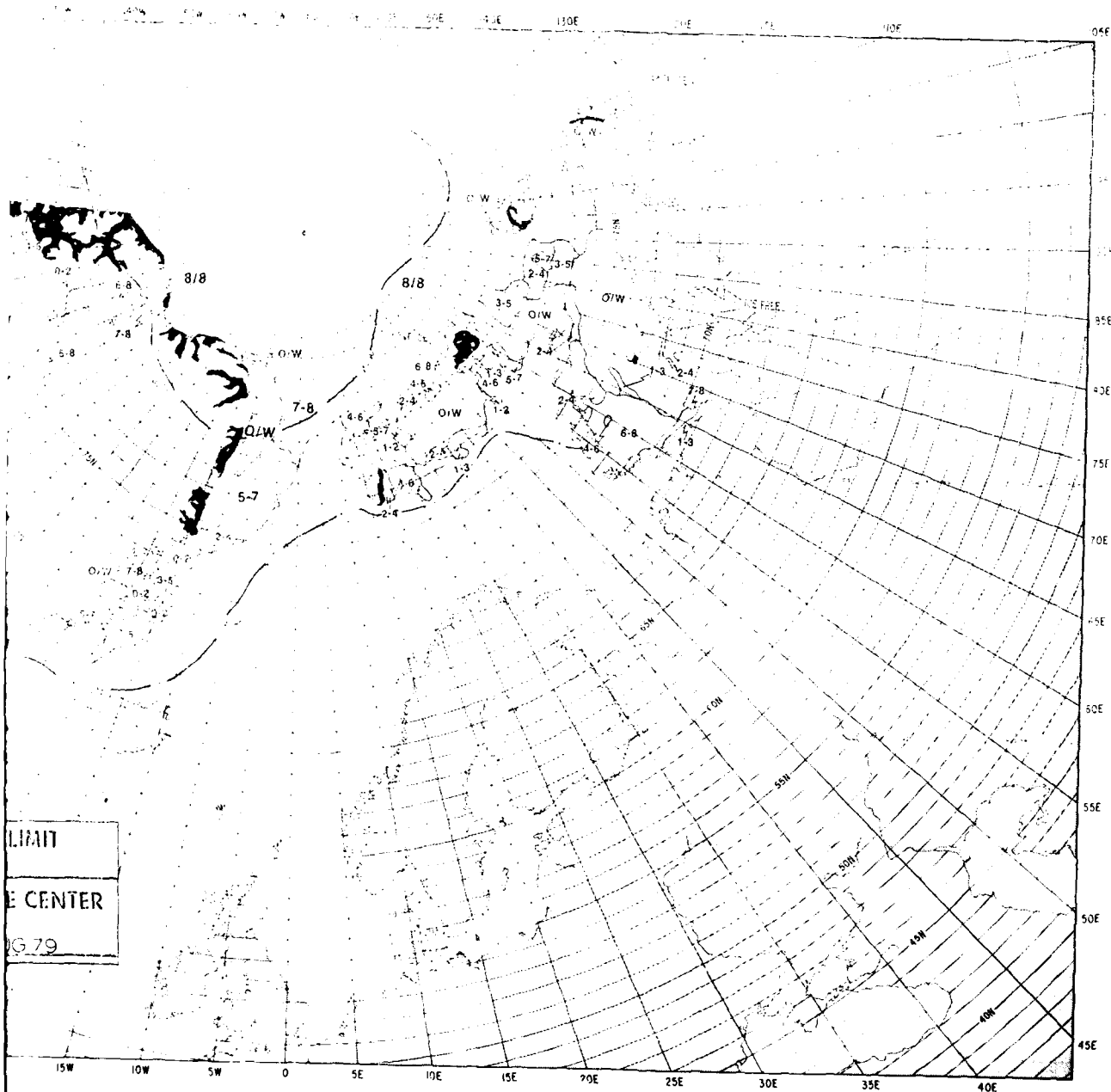


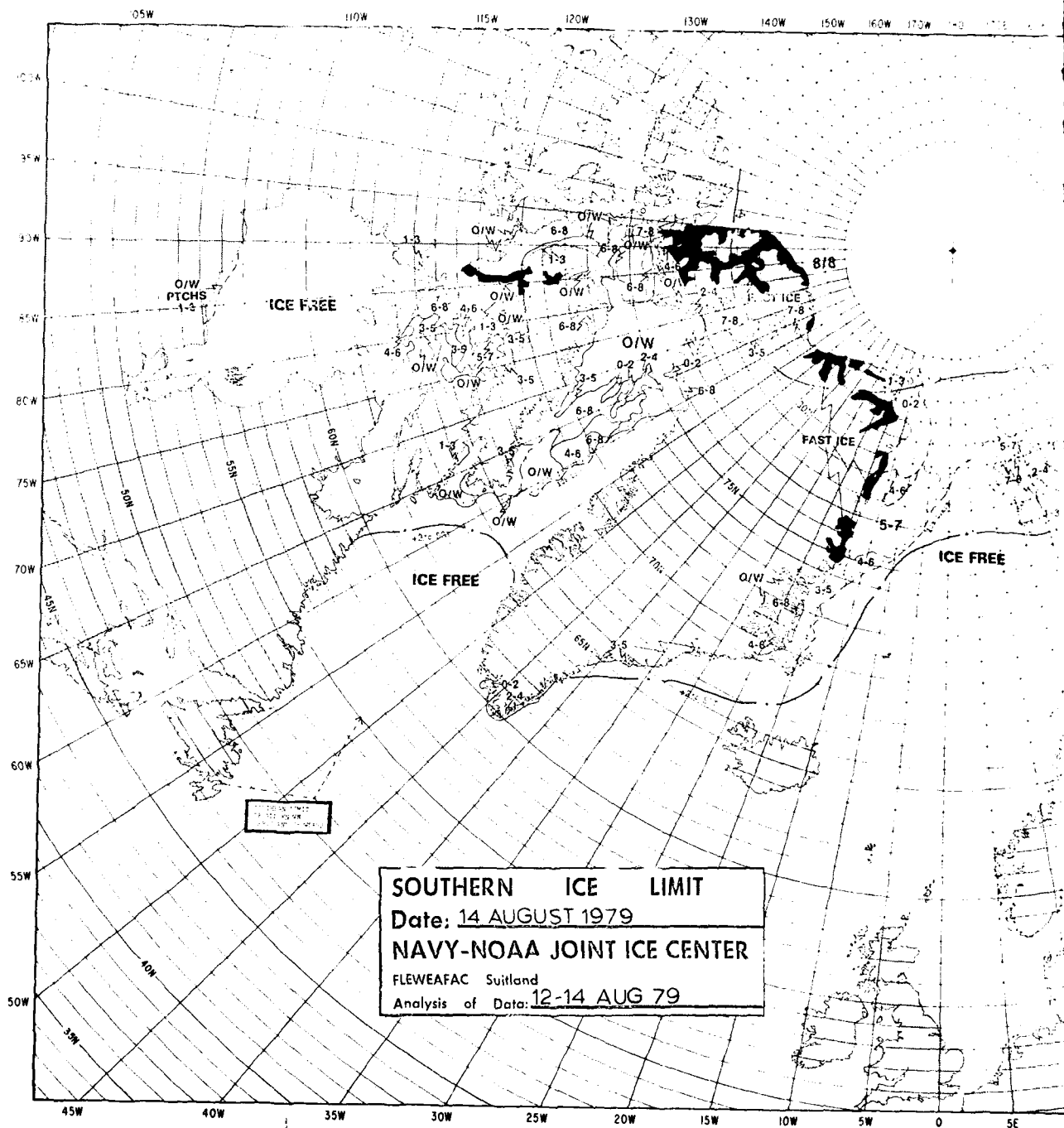
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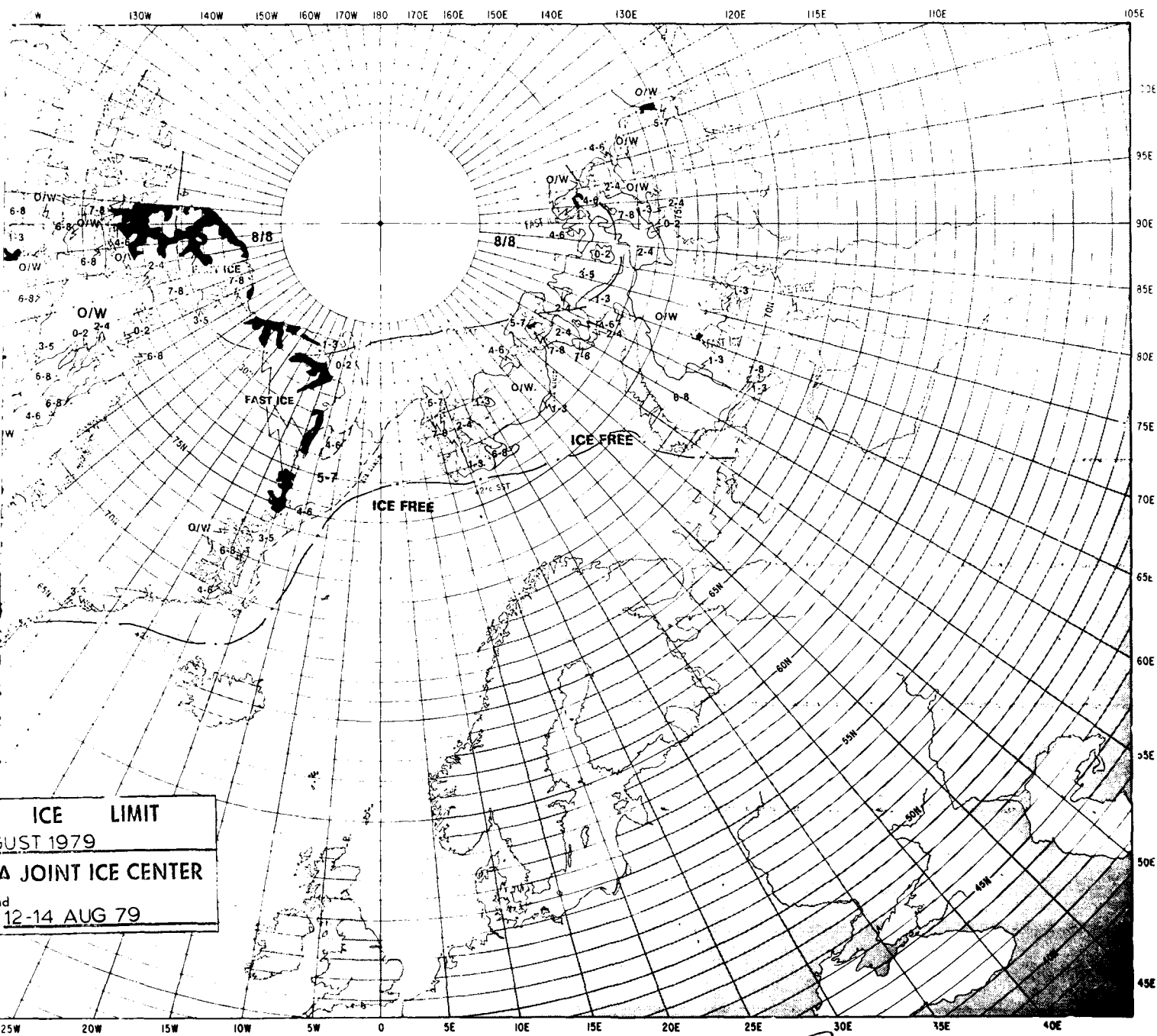


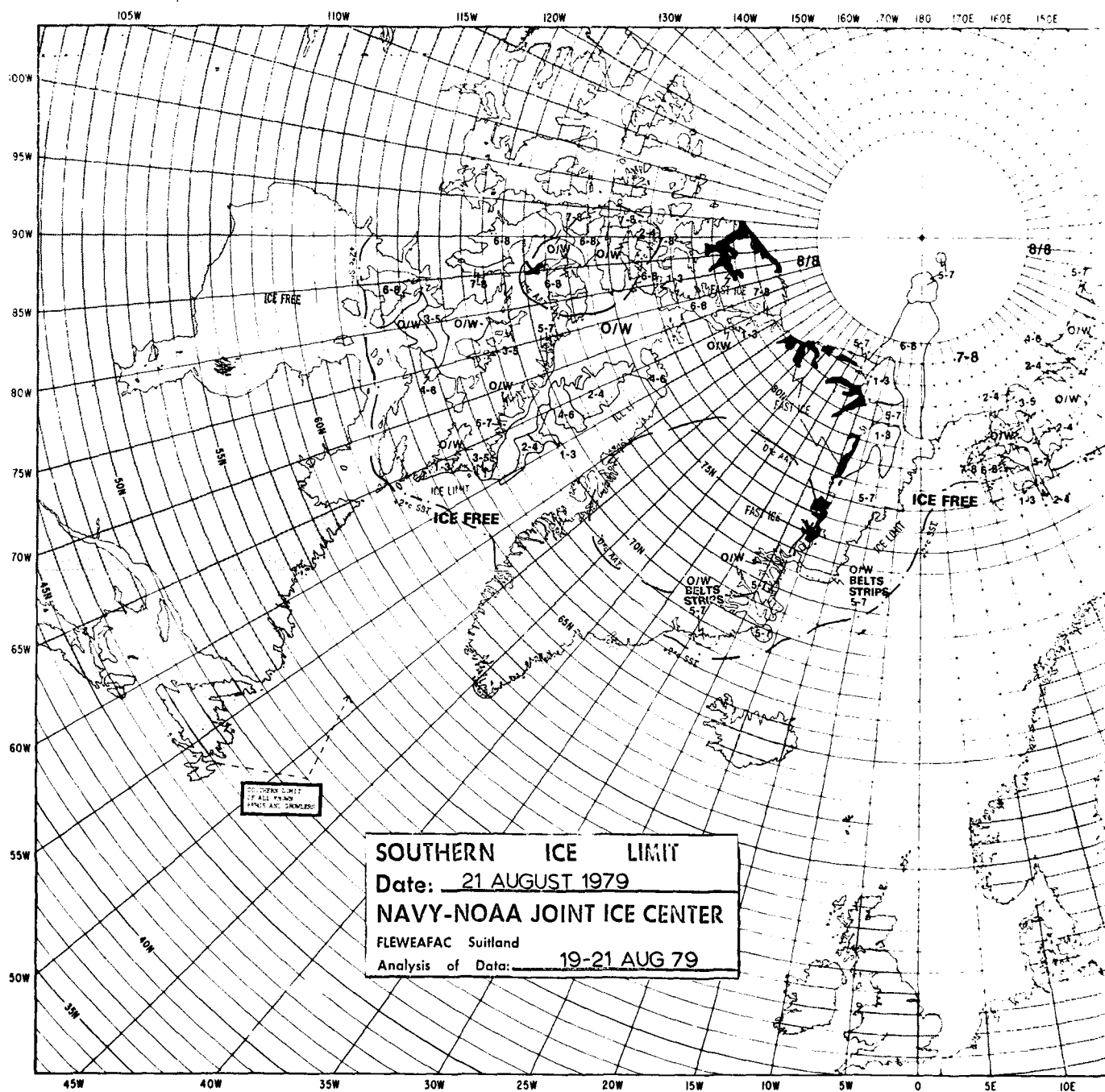


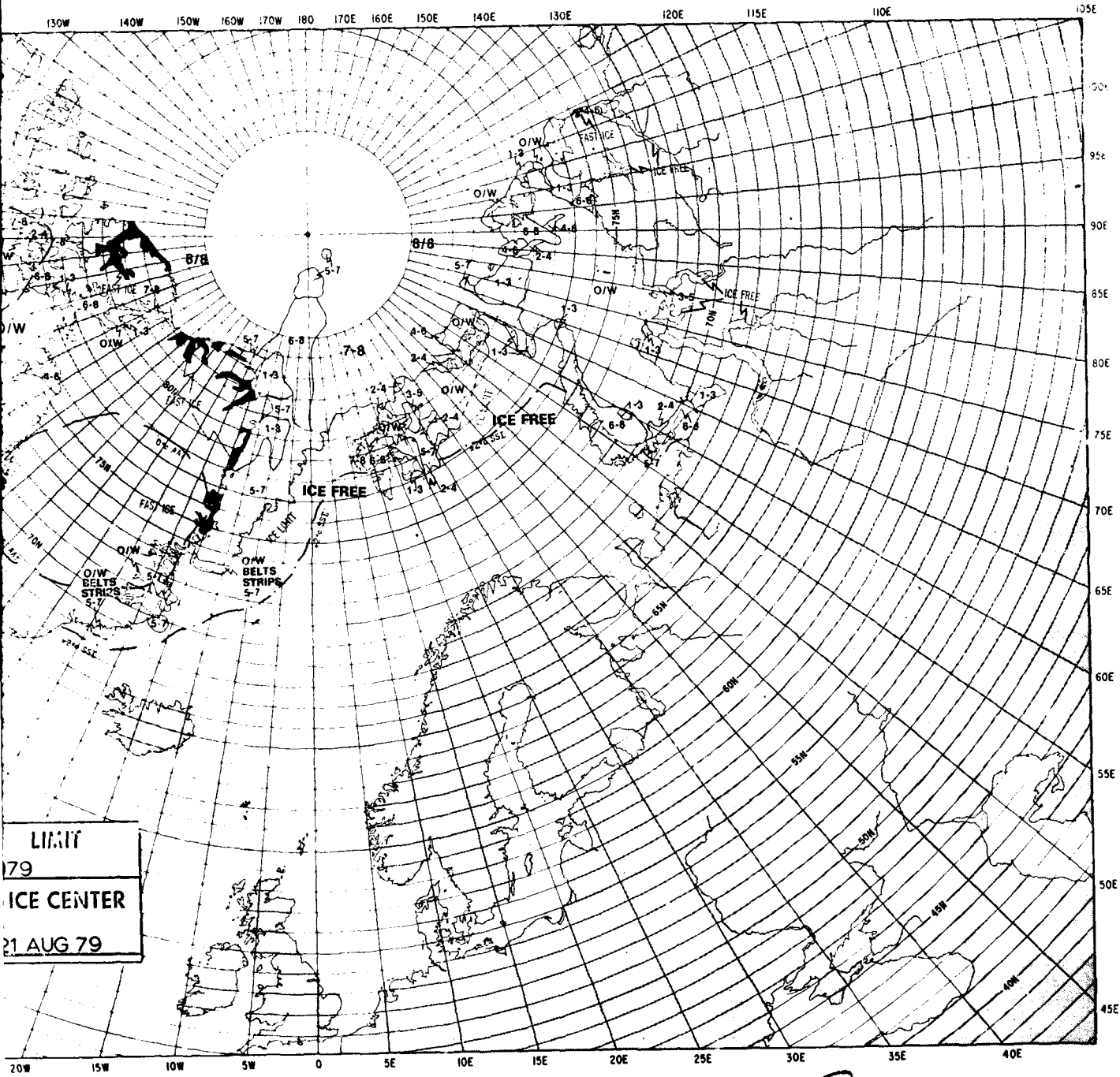




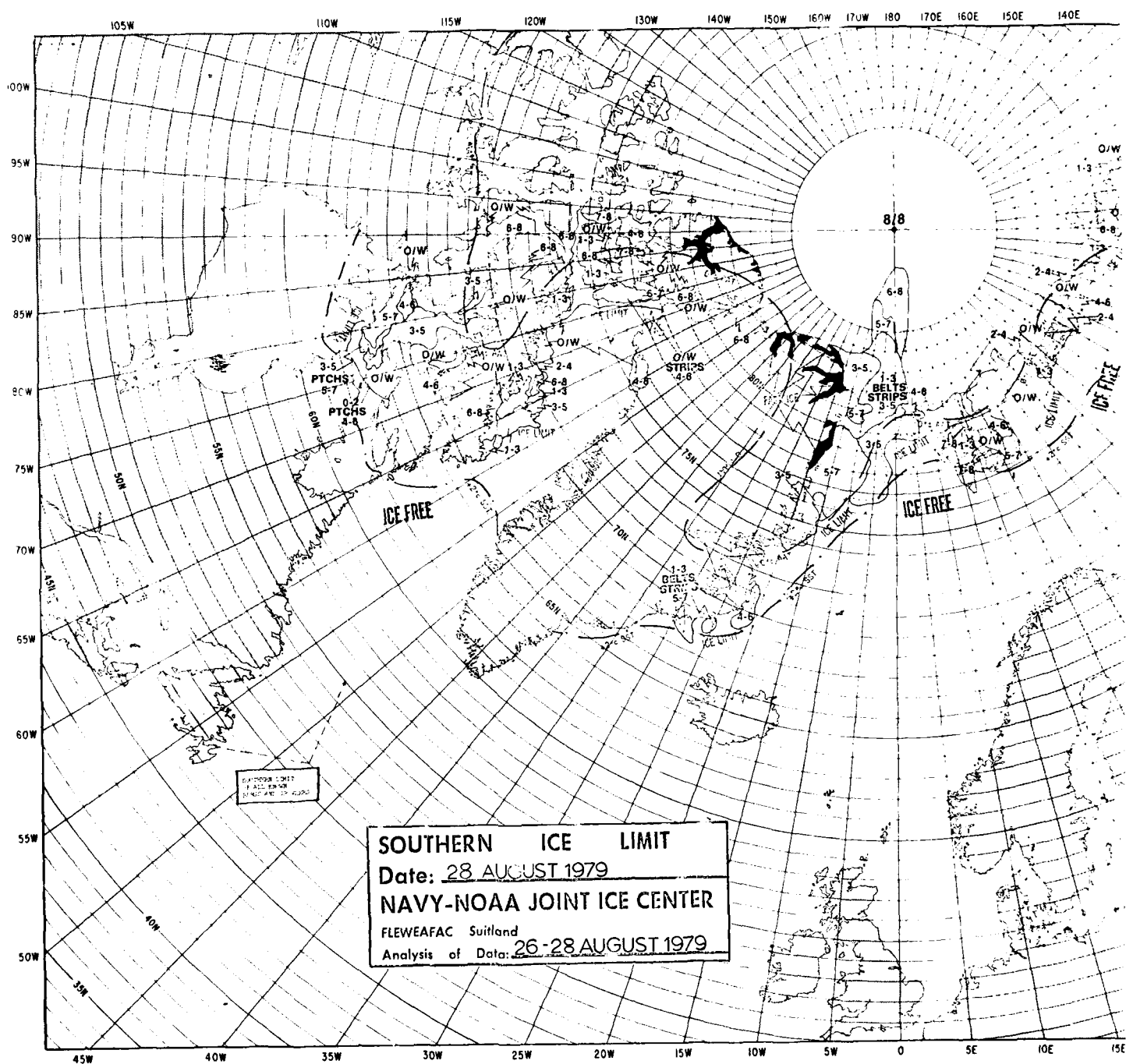


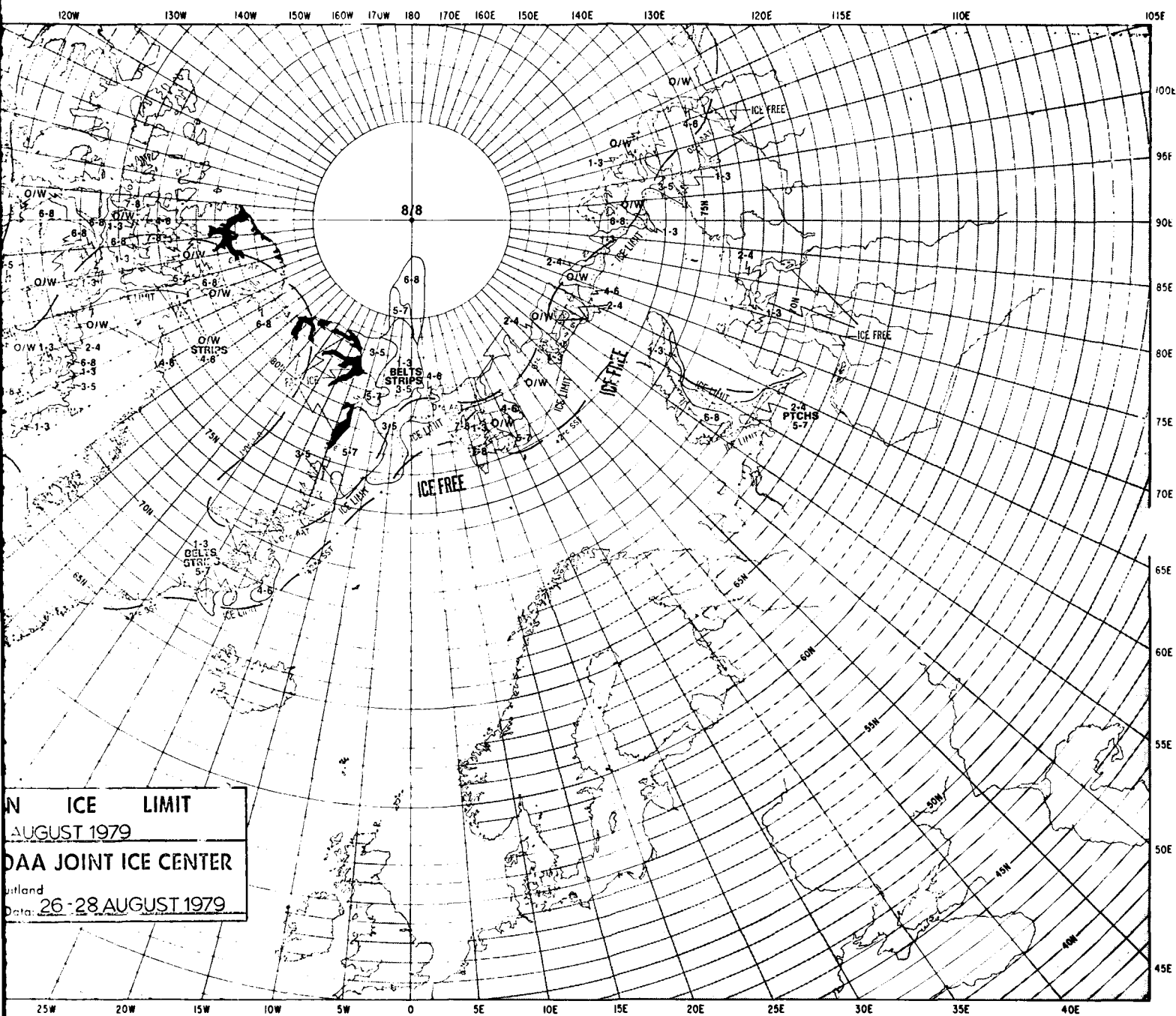


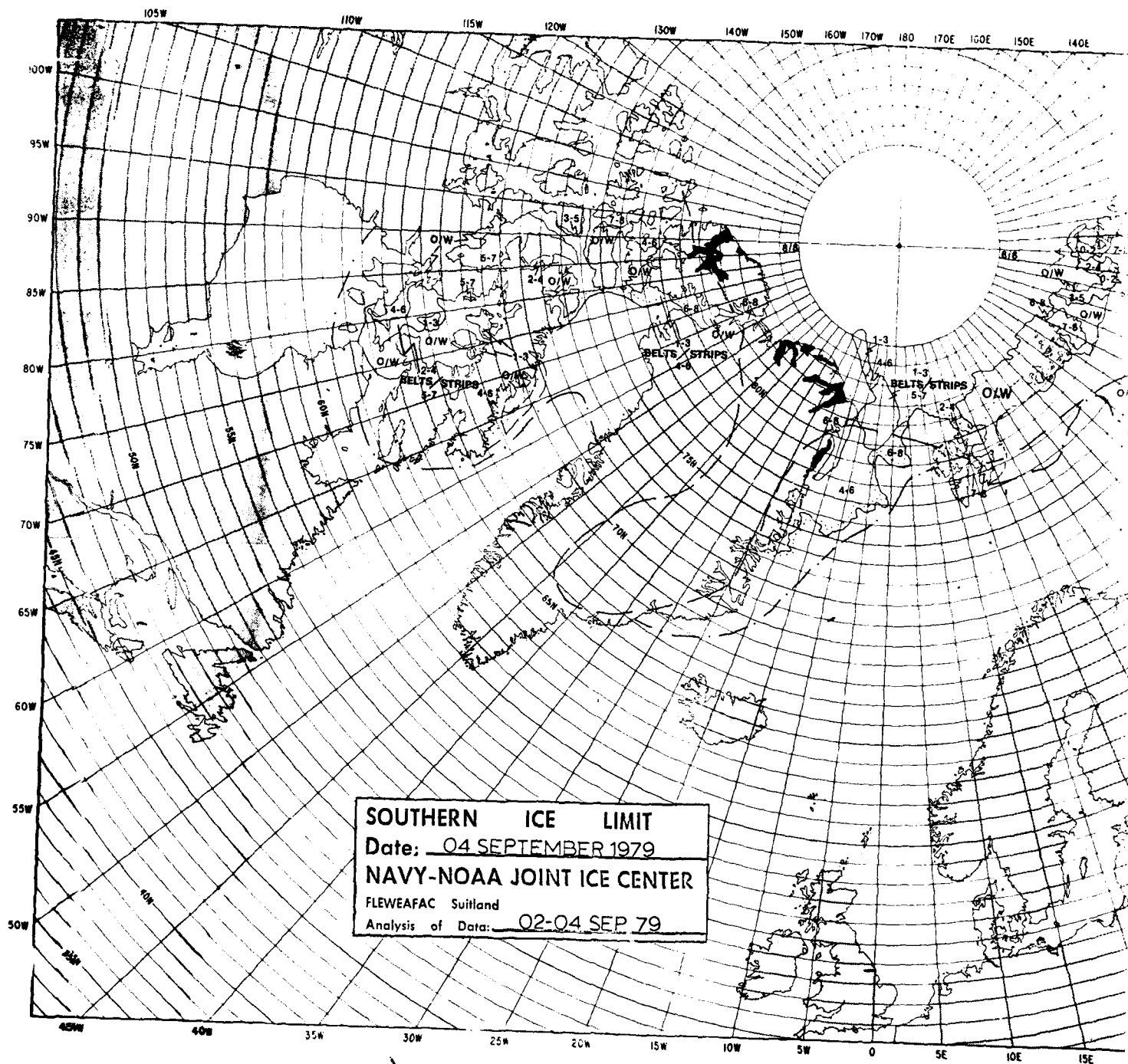


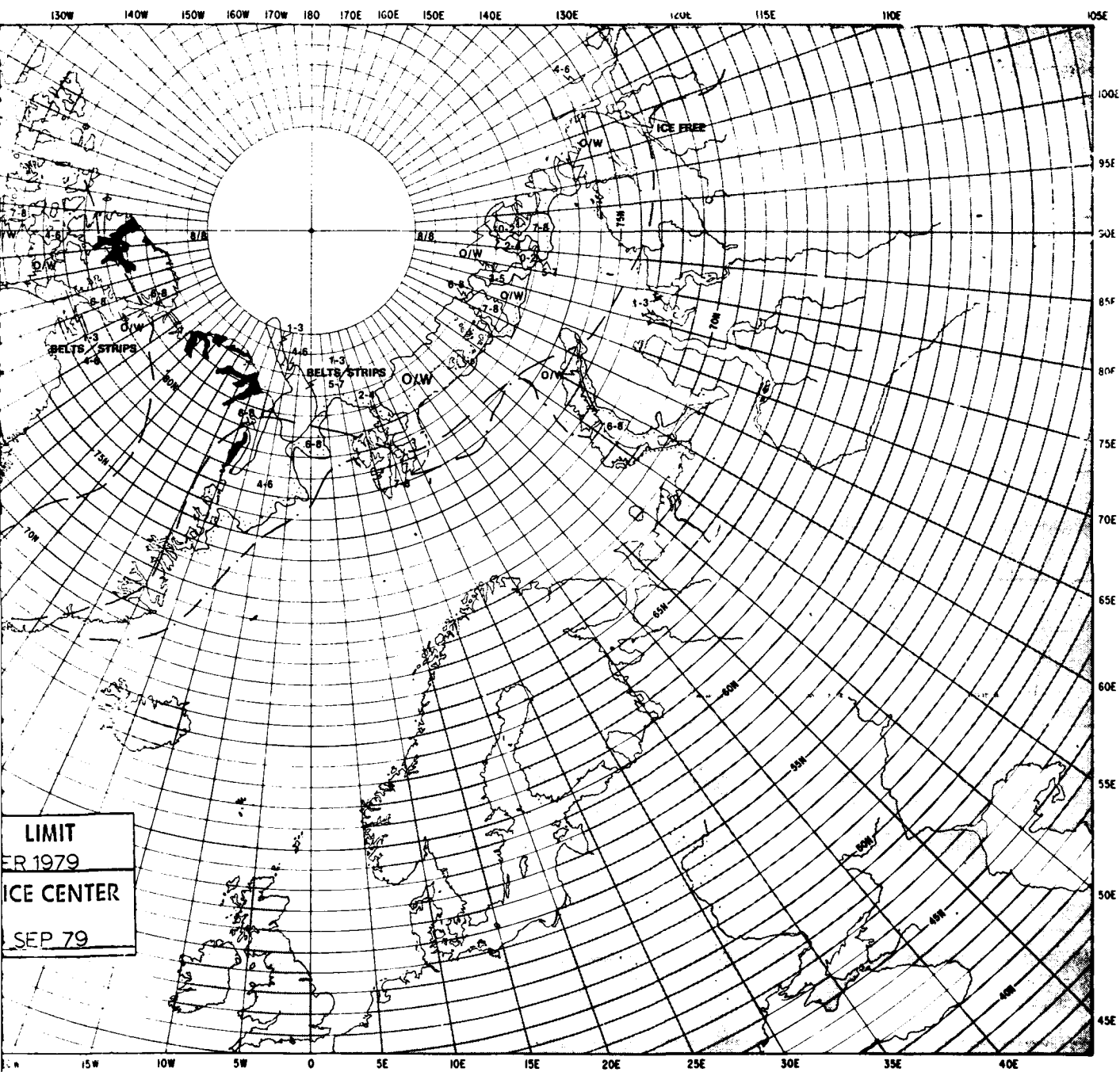


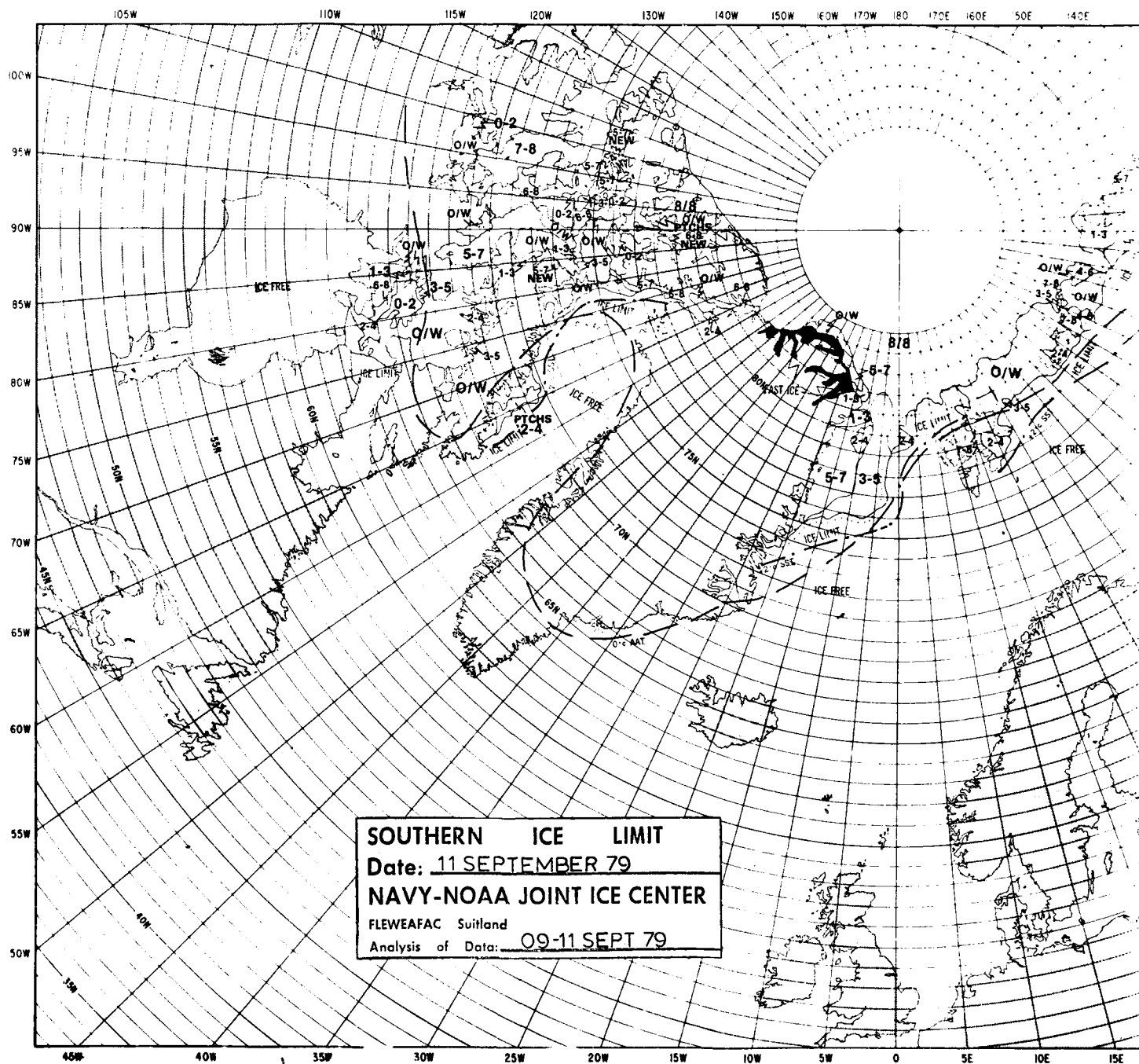
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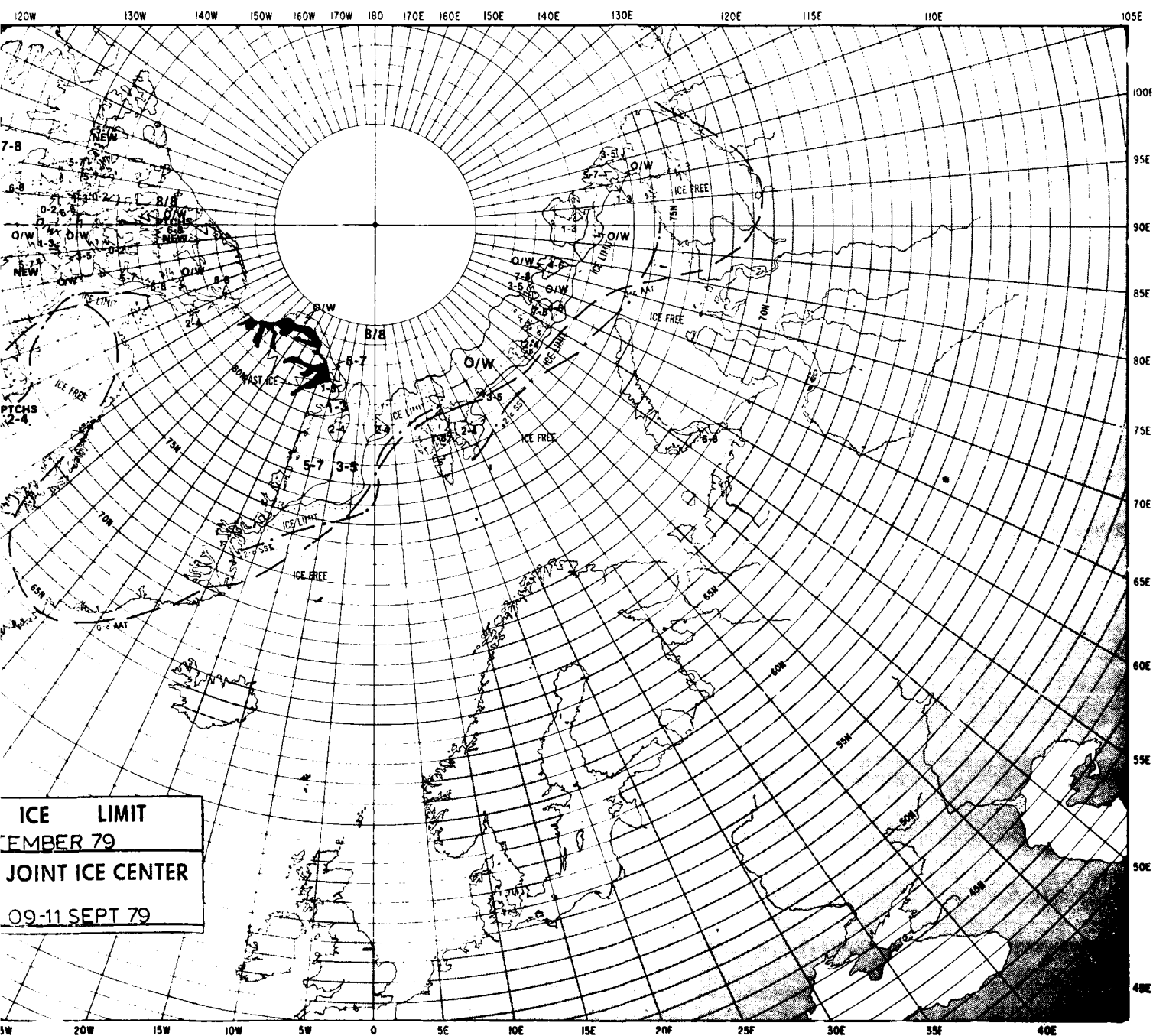


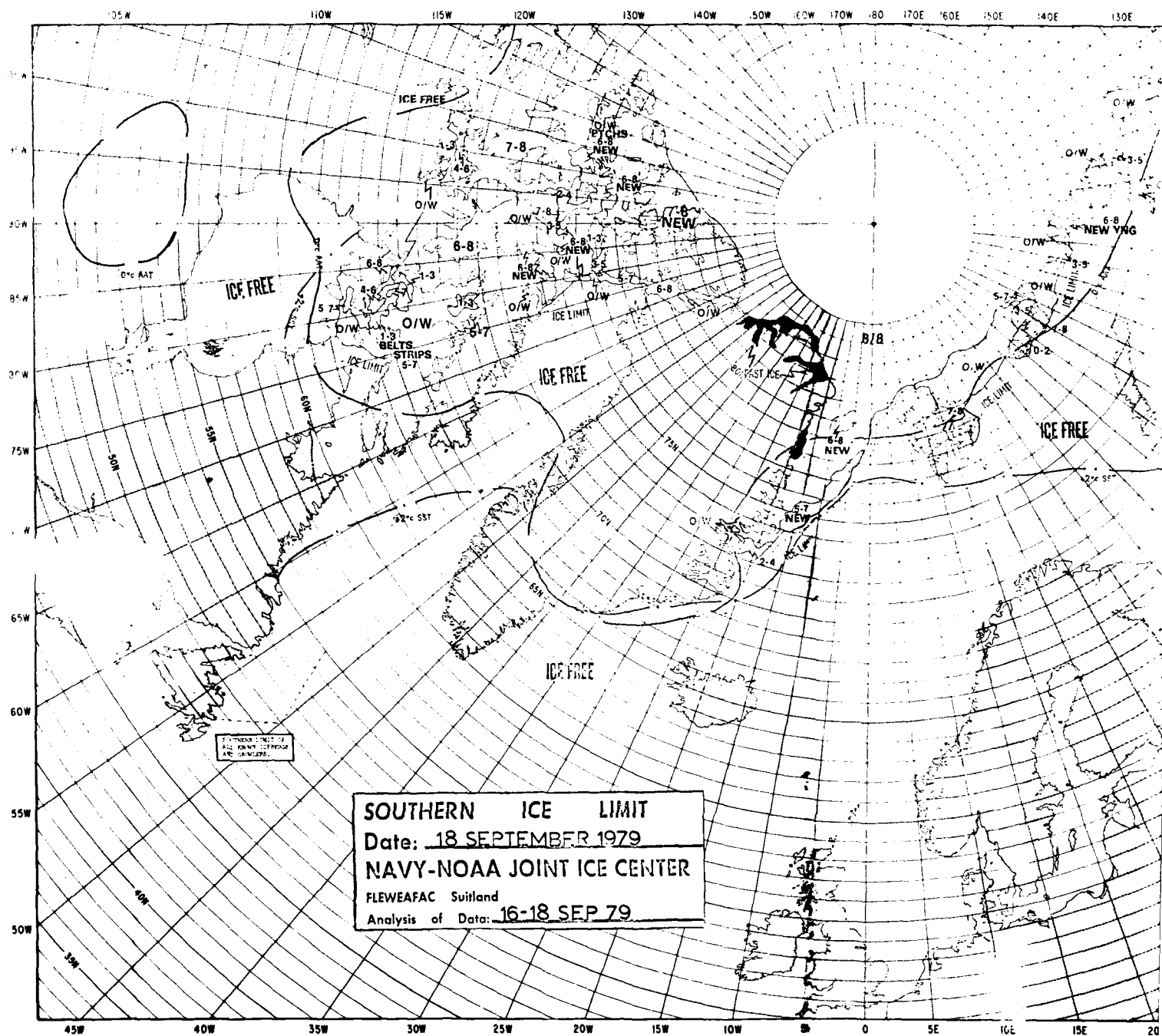


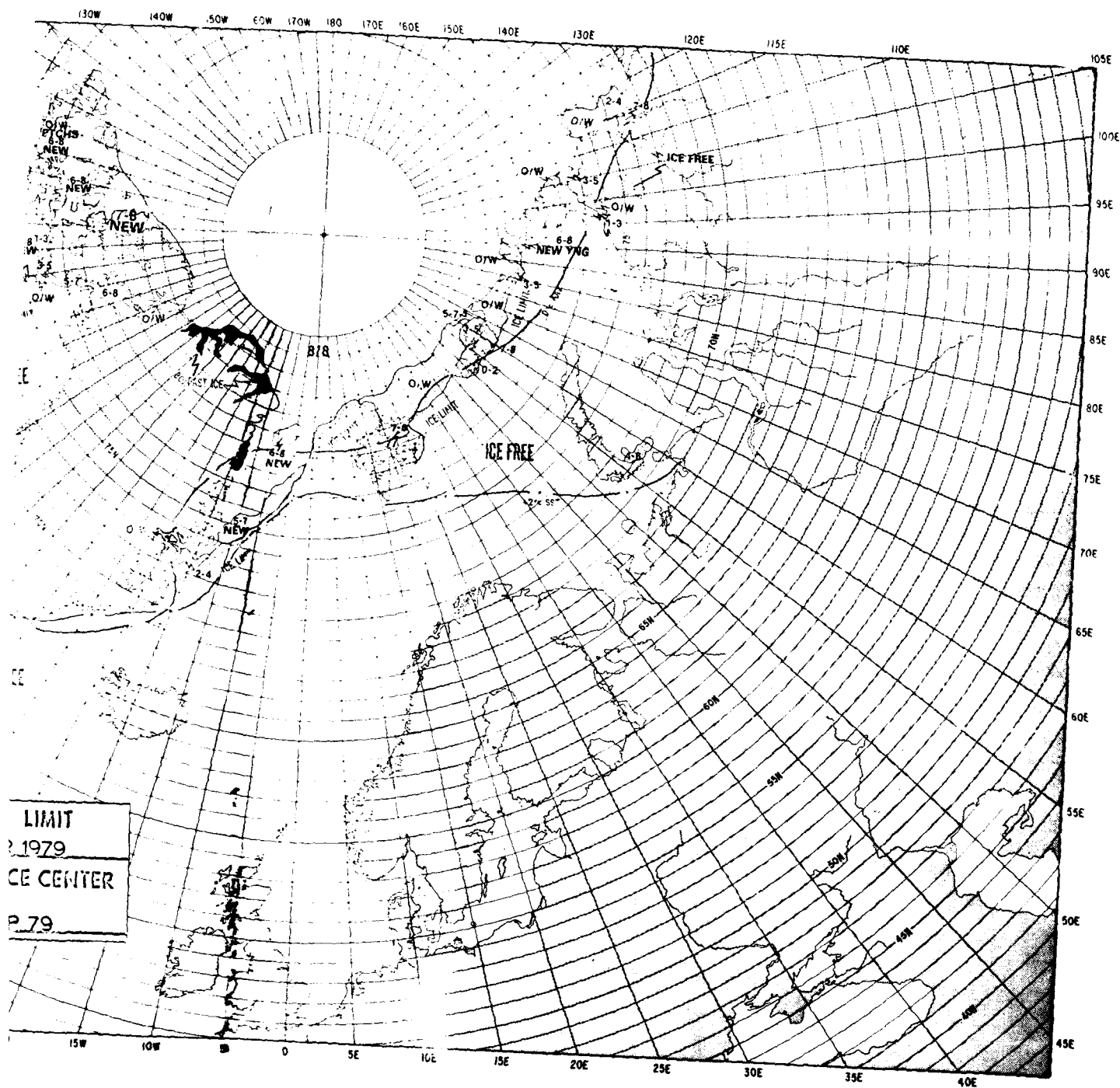


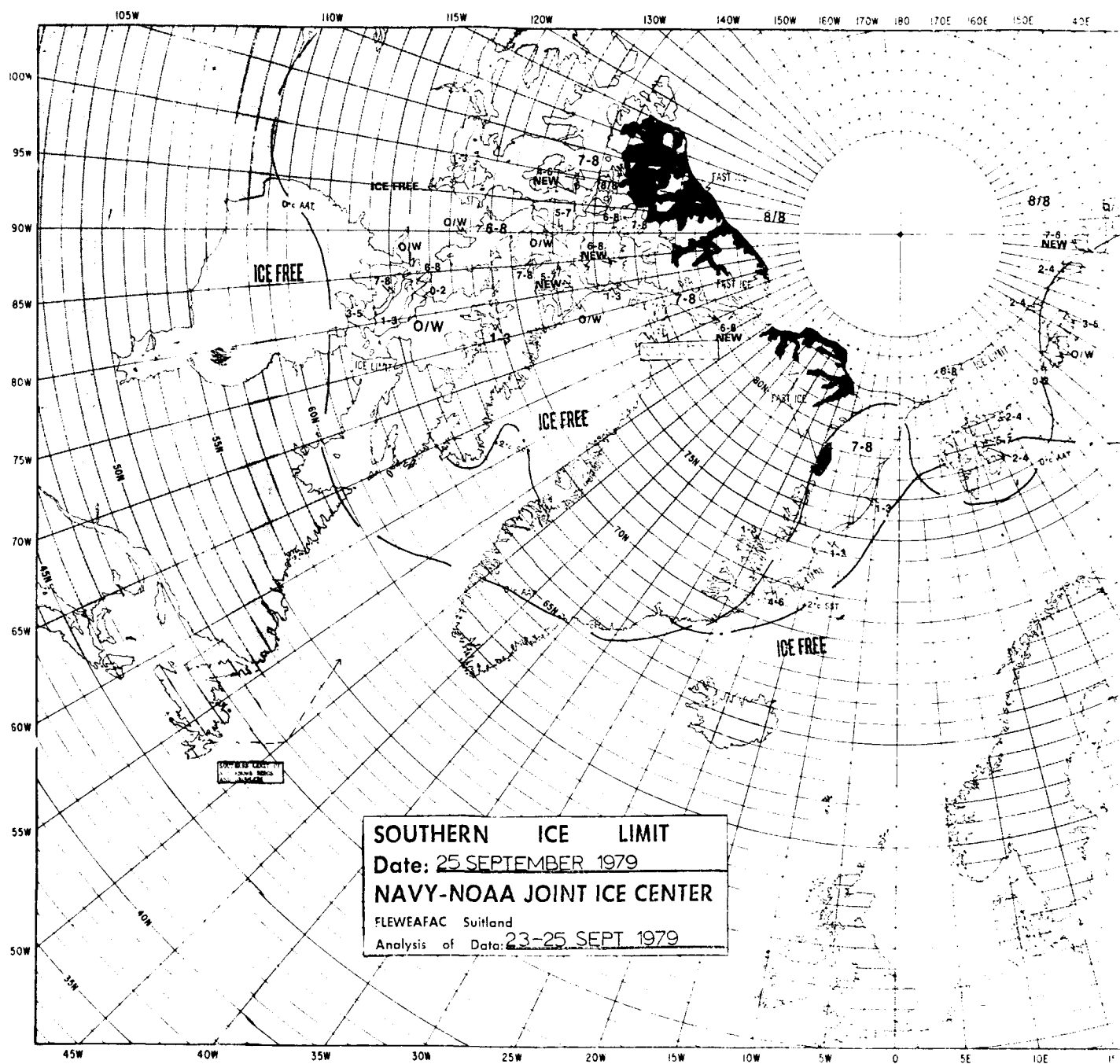


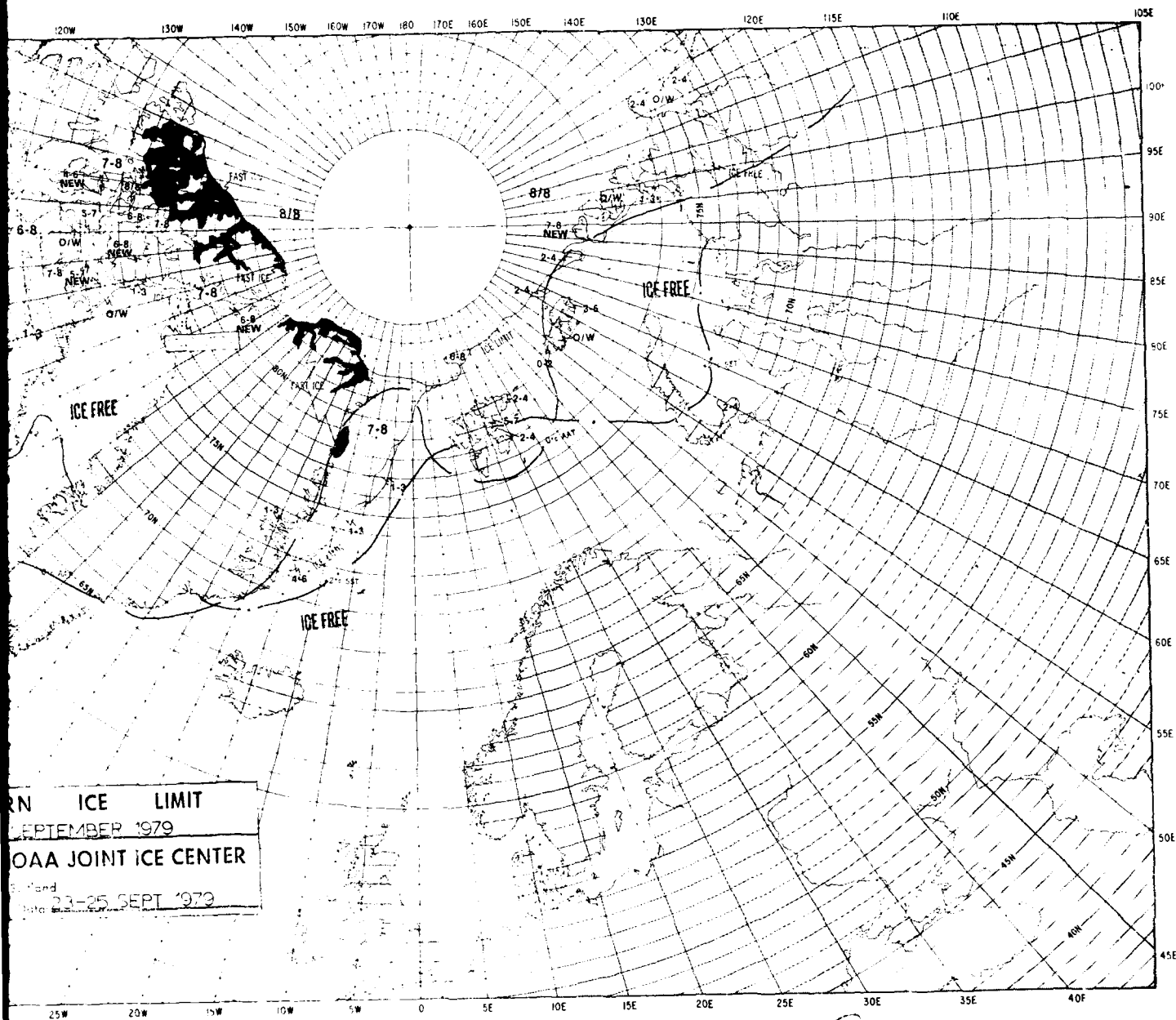




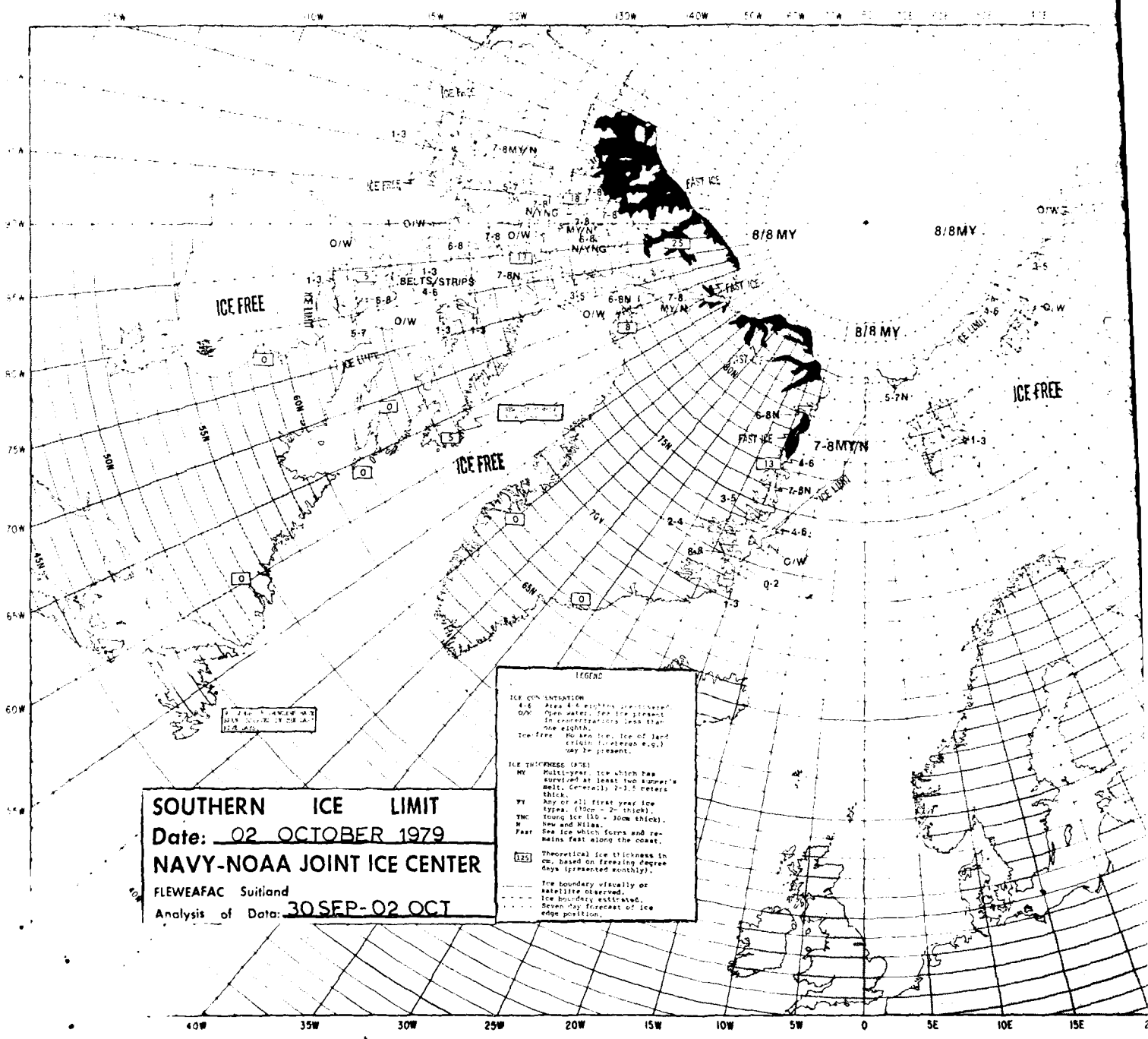




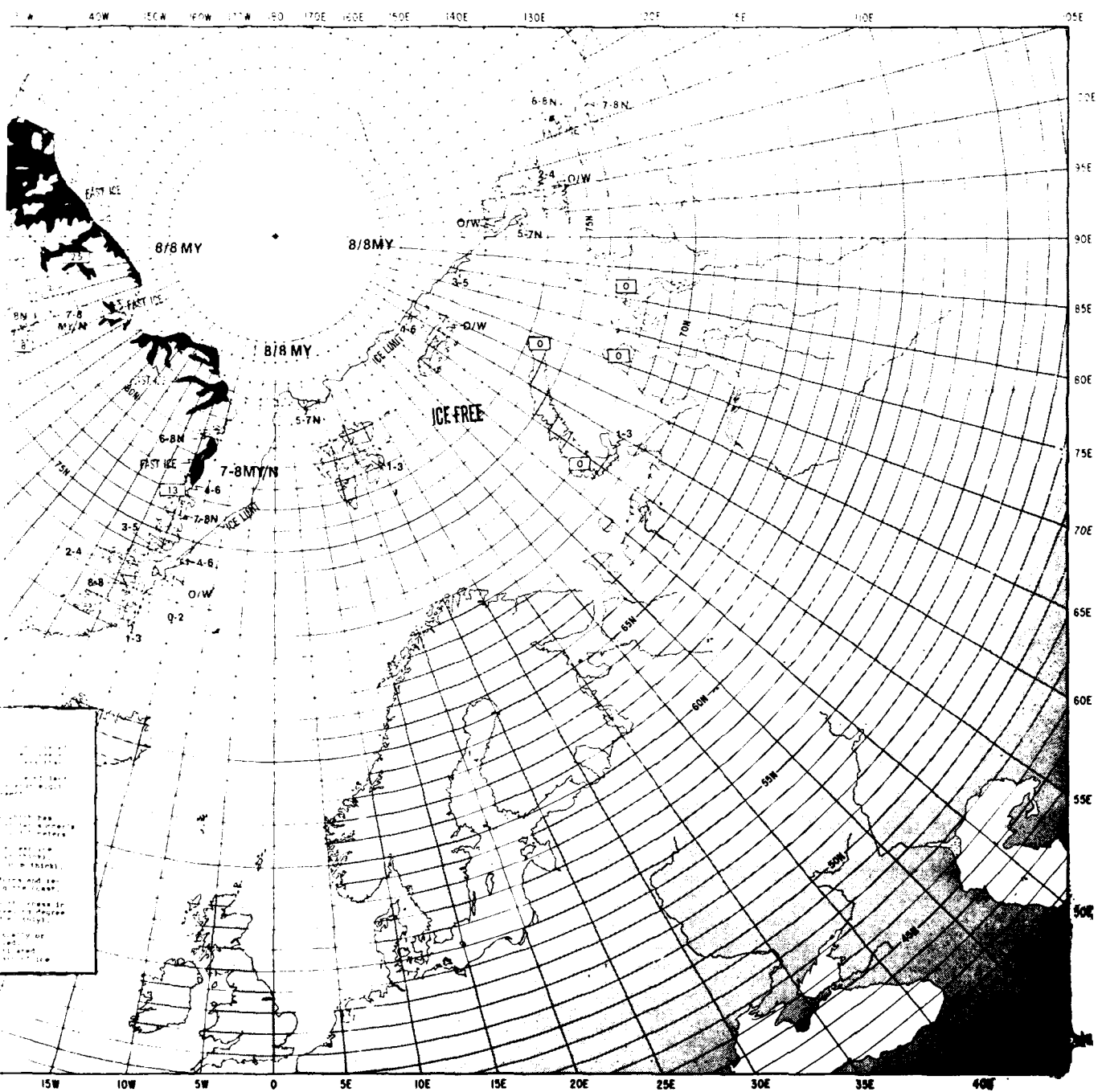


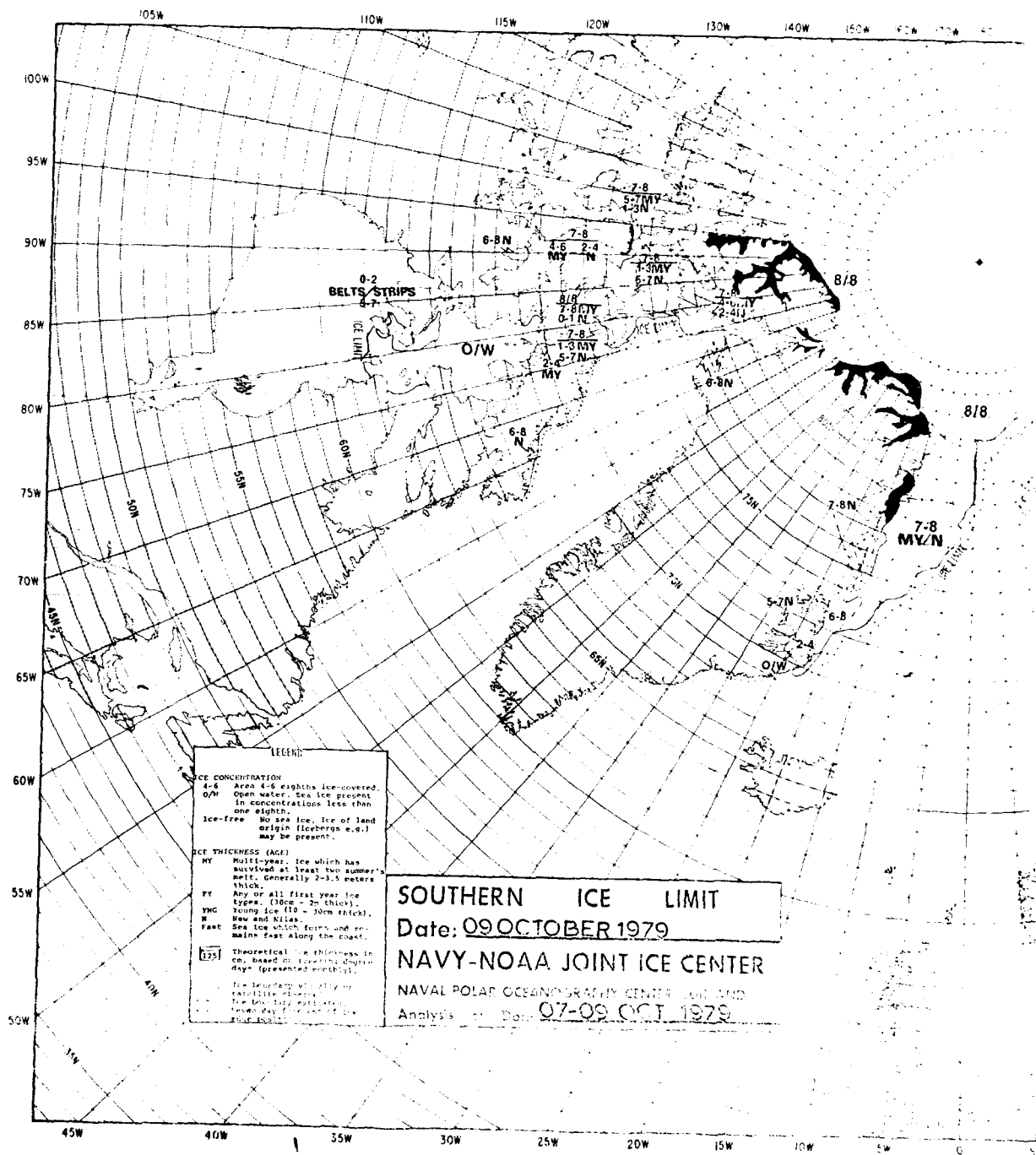


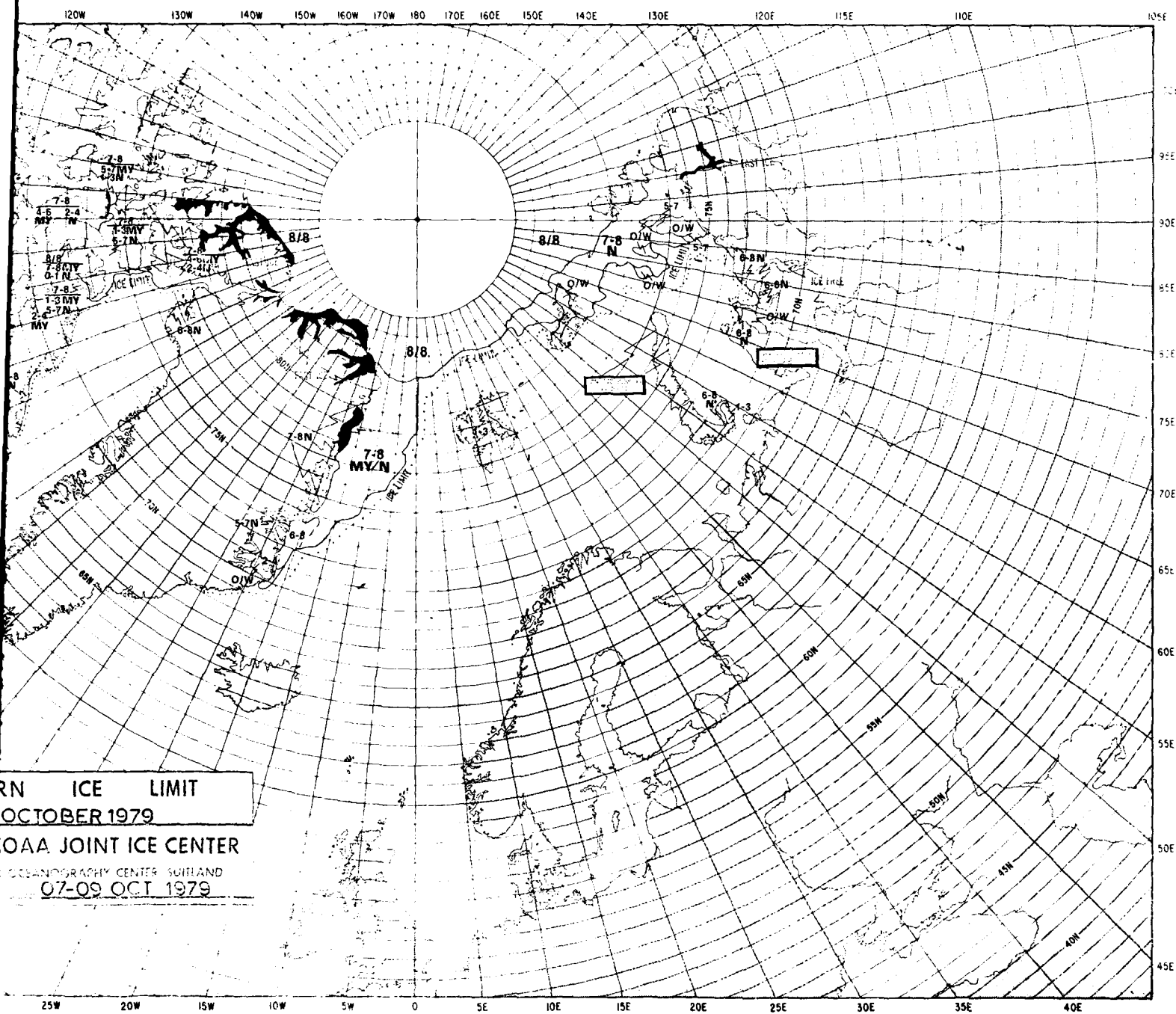
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 OAA JOINT ICE CENTER
 23-25 SEPT 1979

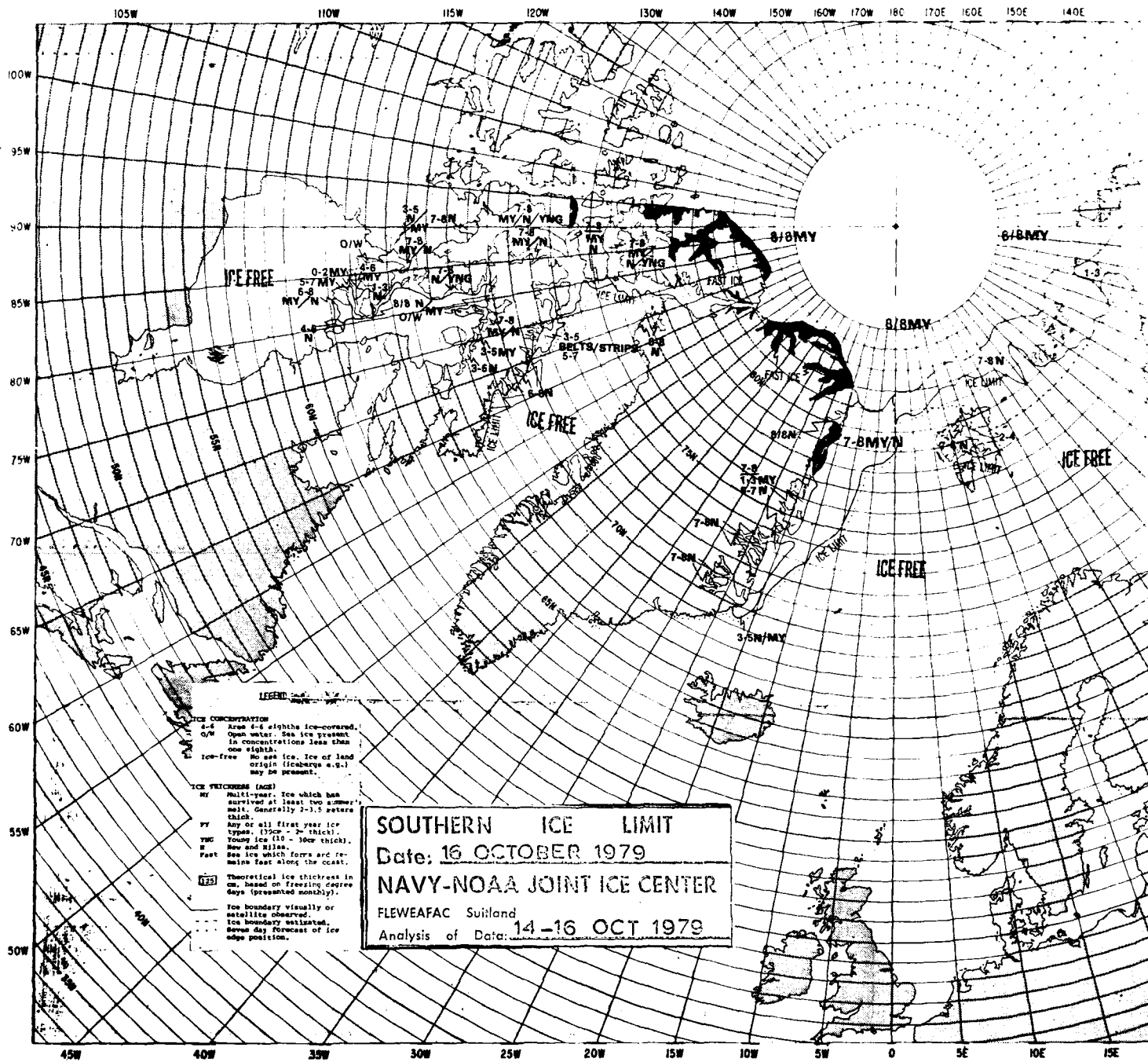


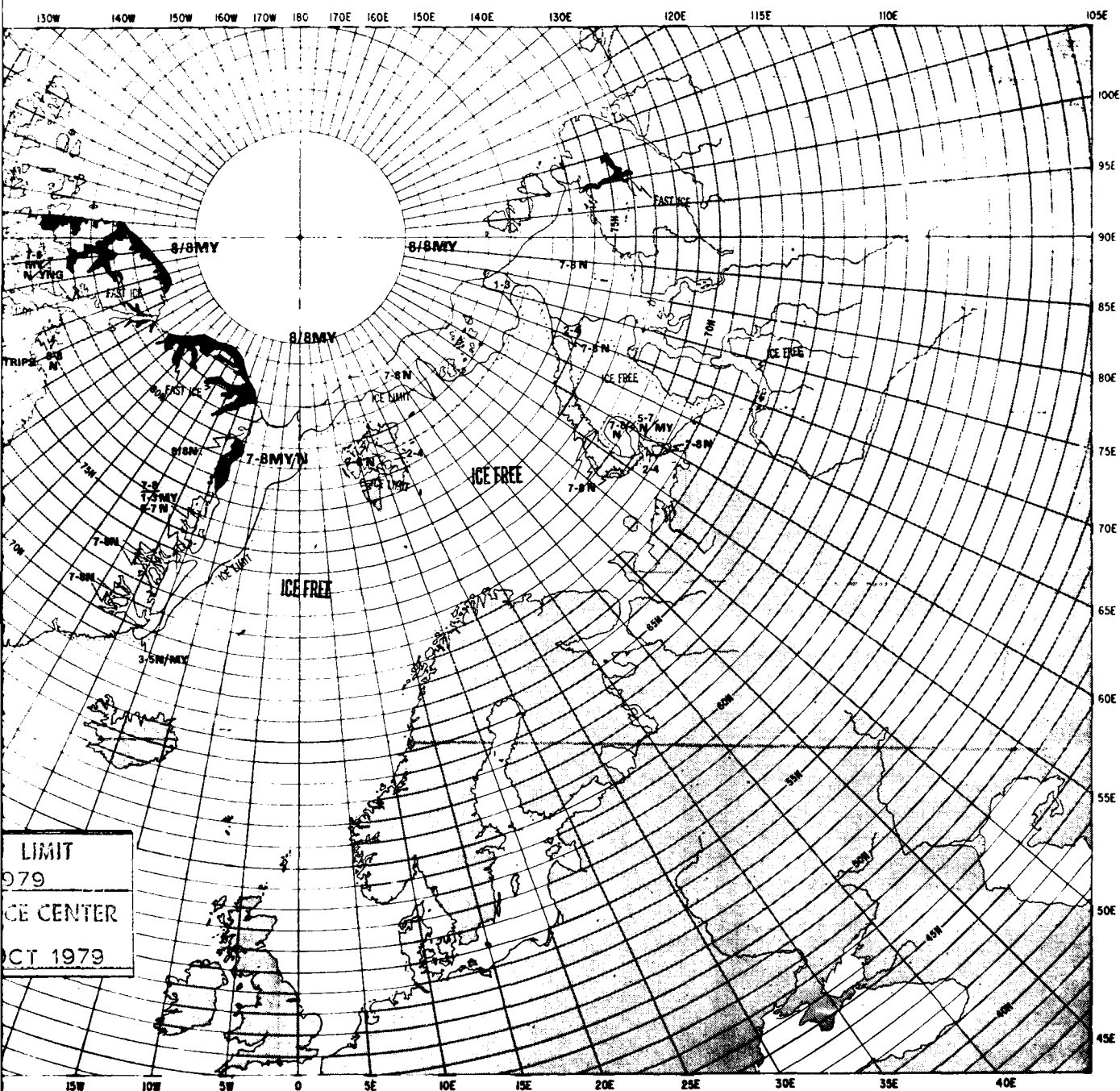
SOUTHERN ICE LIMIT
Date: 02 OCTOBER 1979
NAVY-NOAA JOINT ICE CENTER
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Analysis of Data: 30 SEP-02 OCT

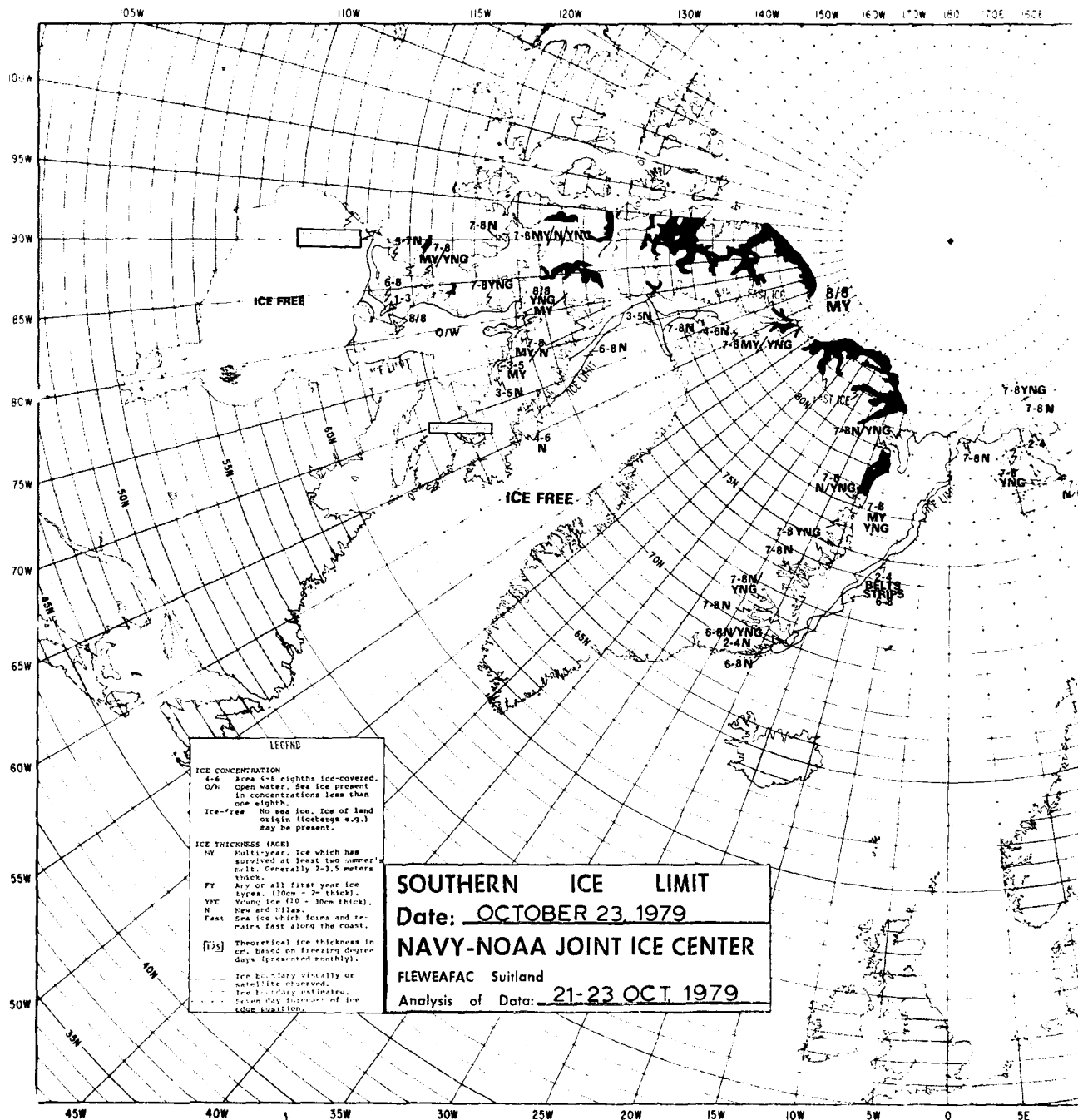


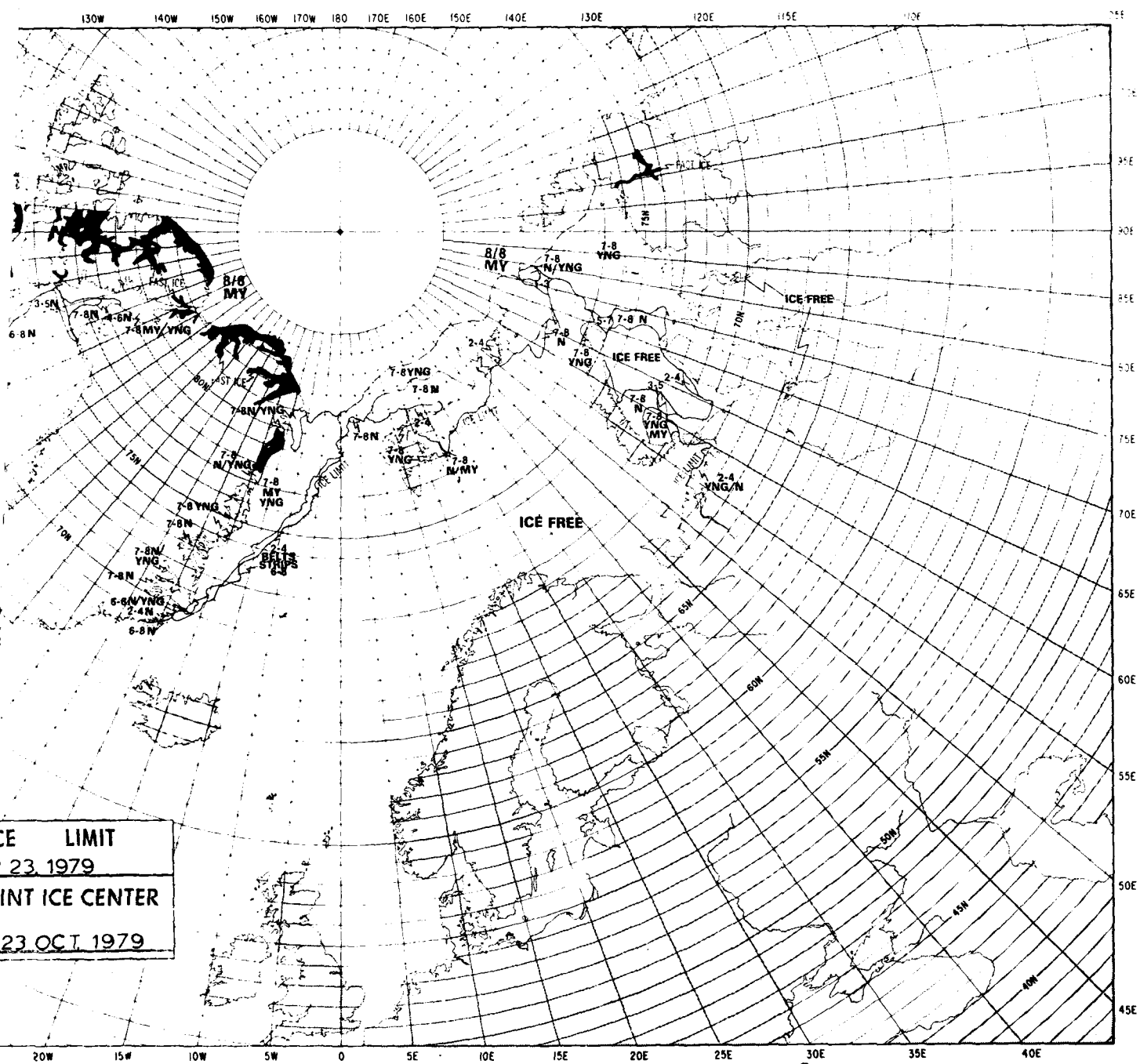


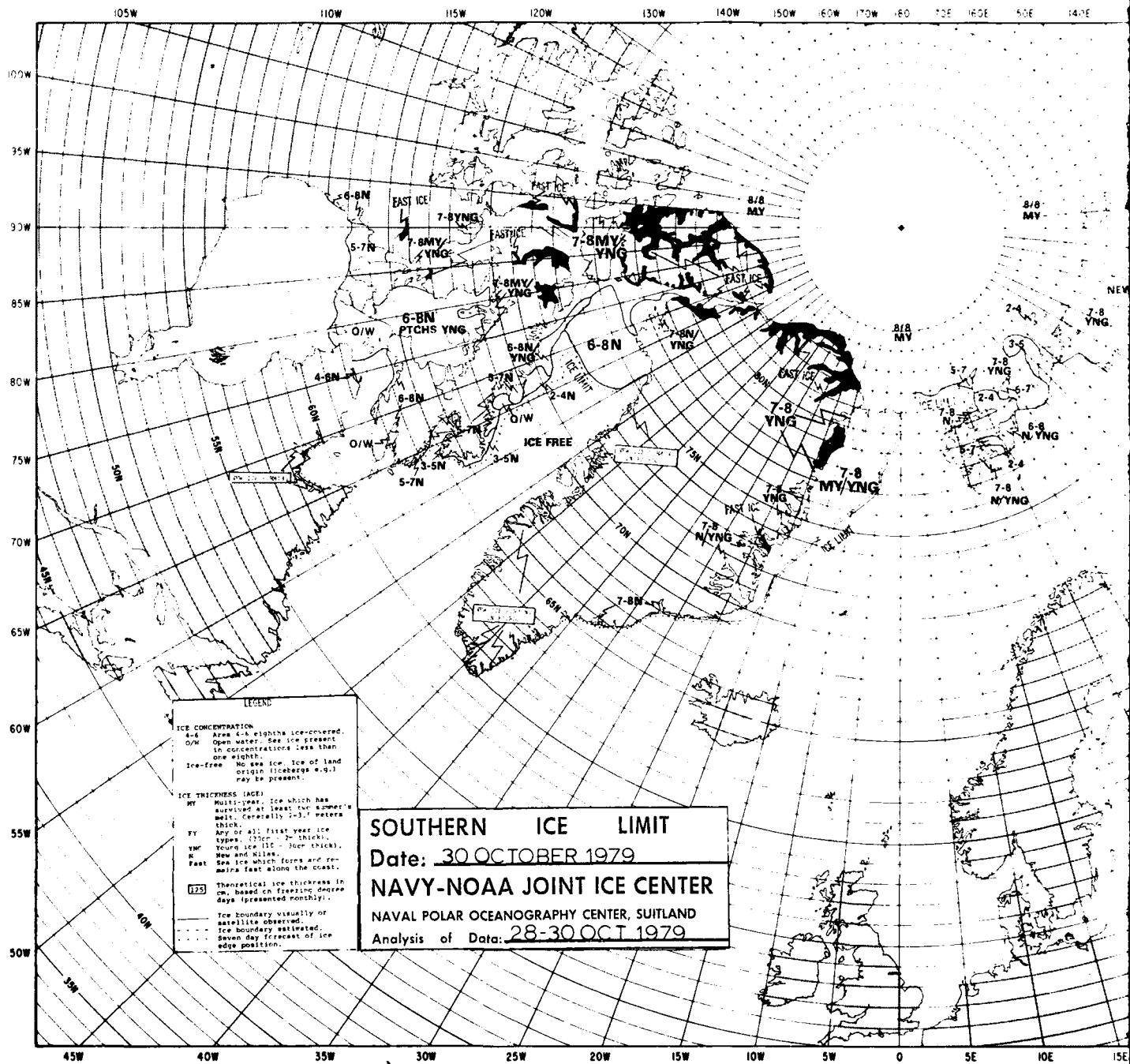


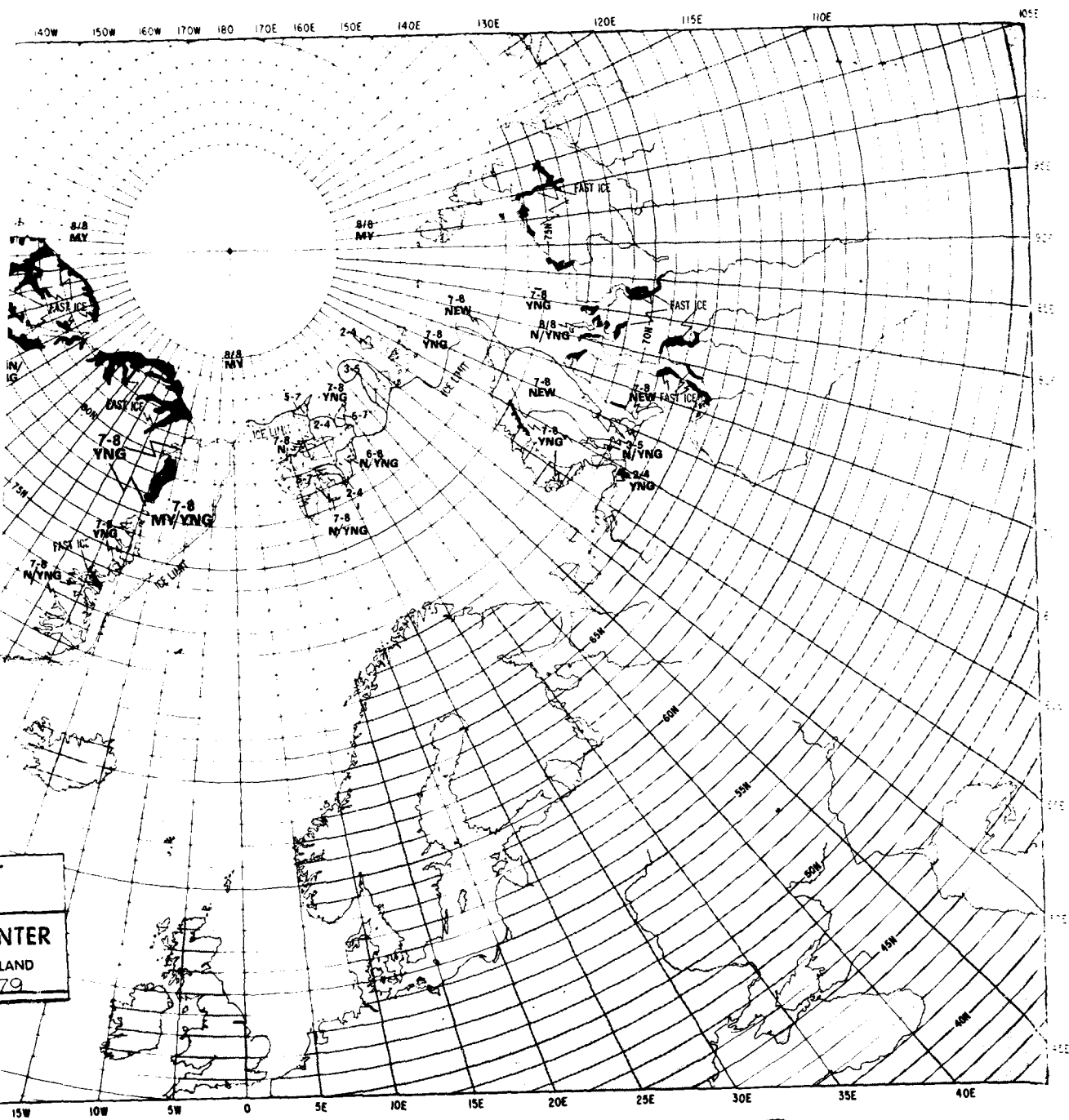


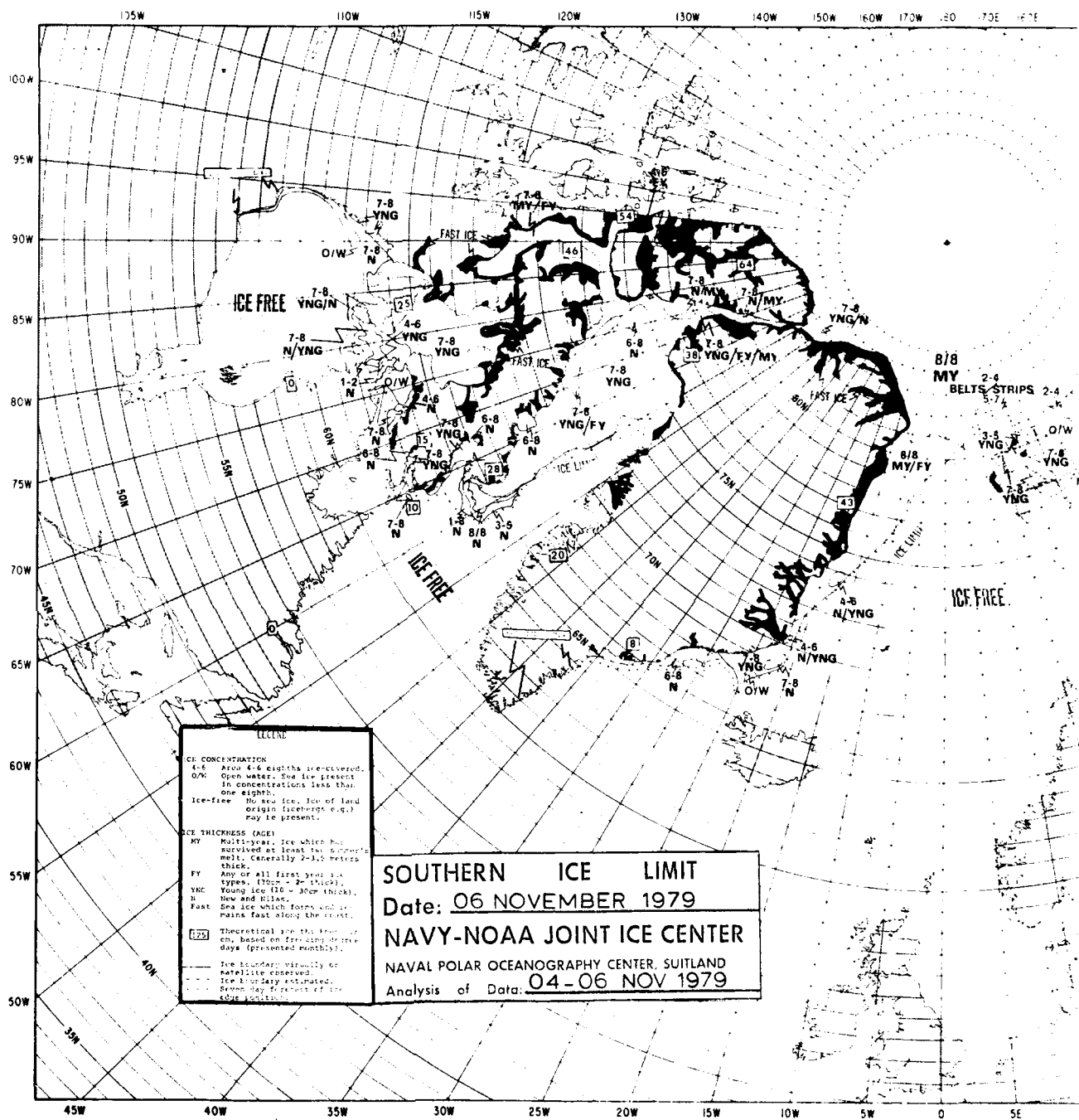


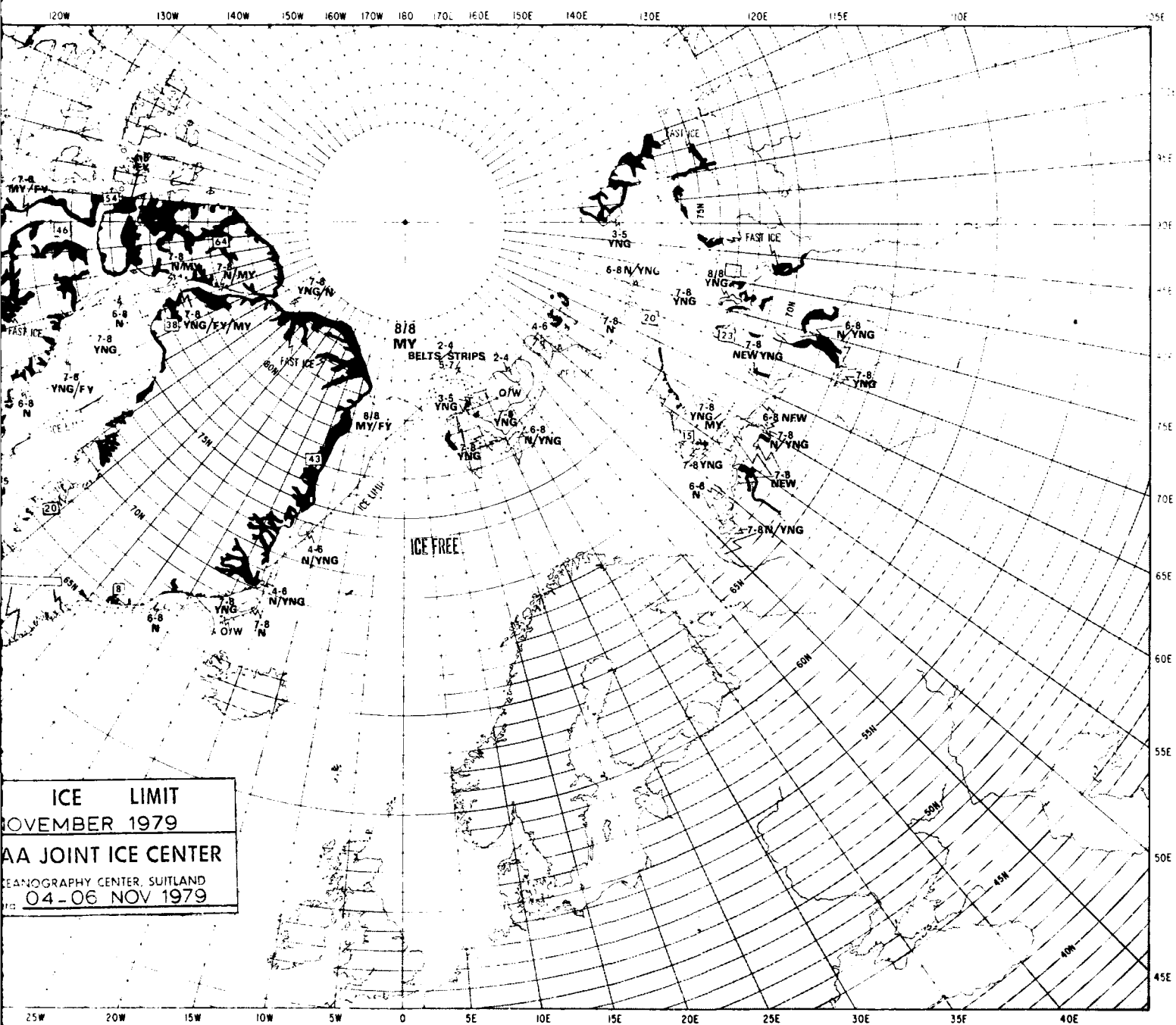




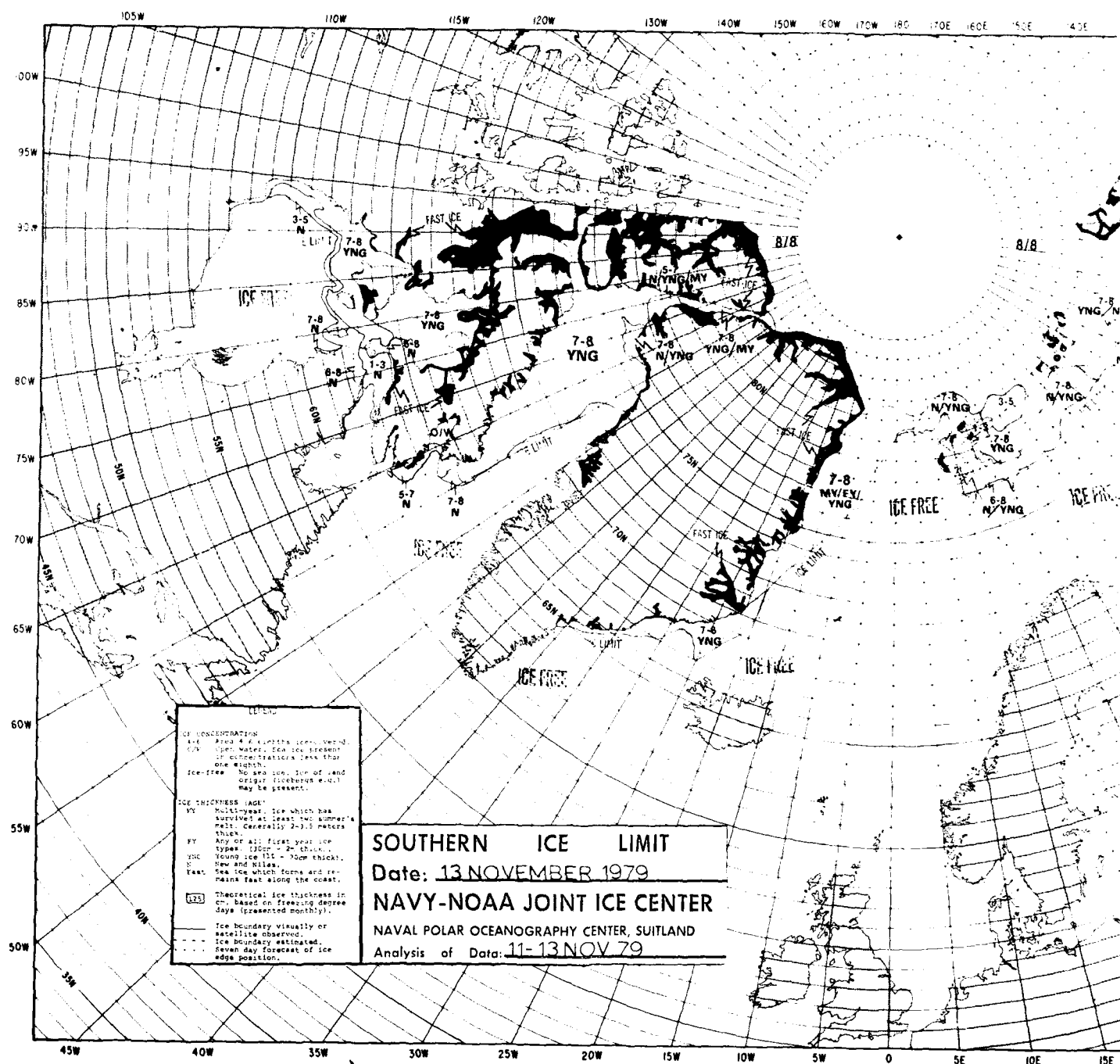


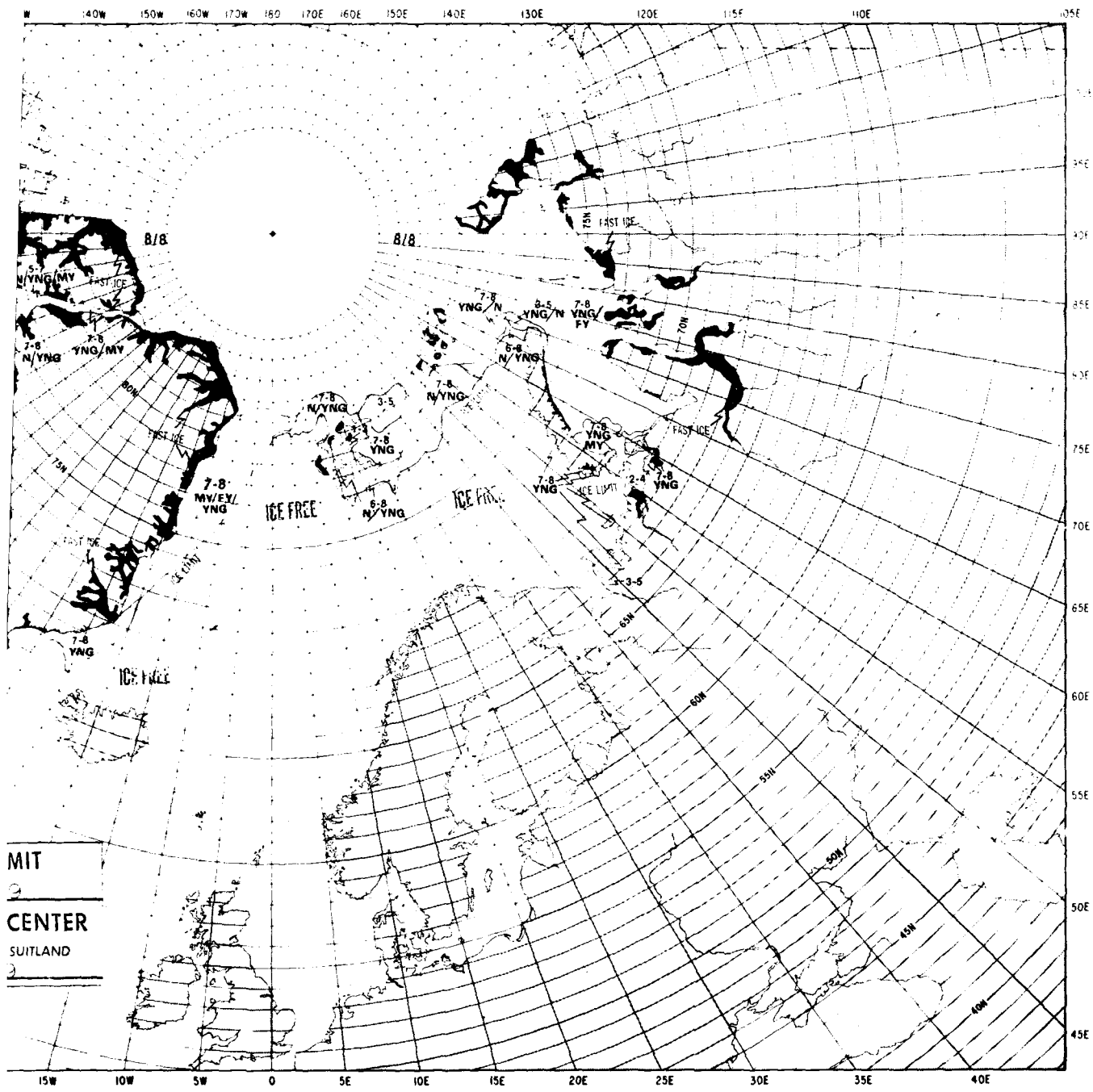






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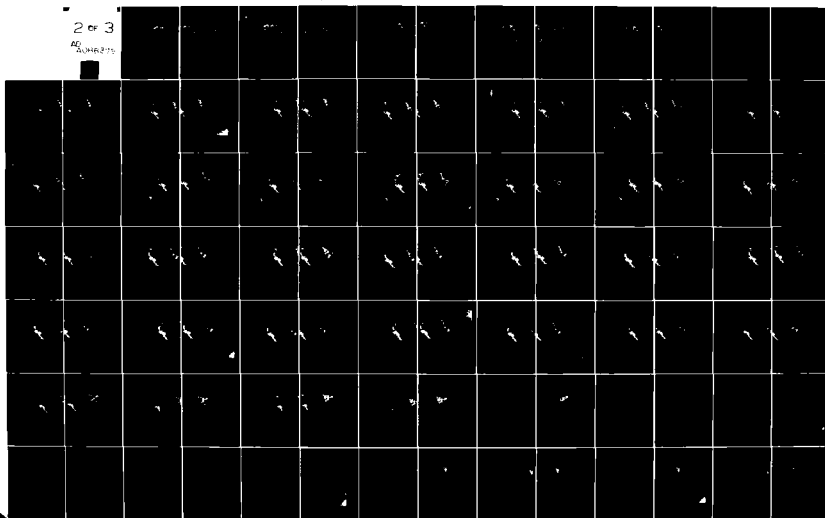
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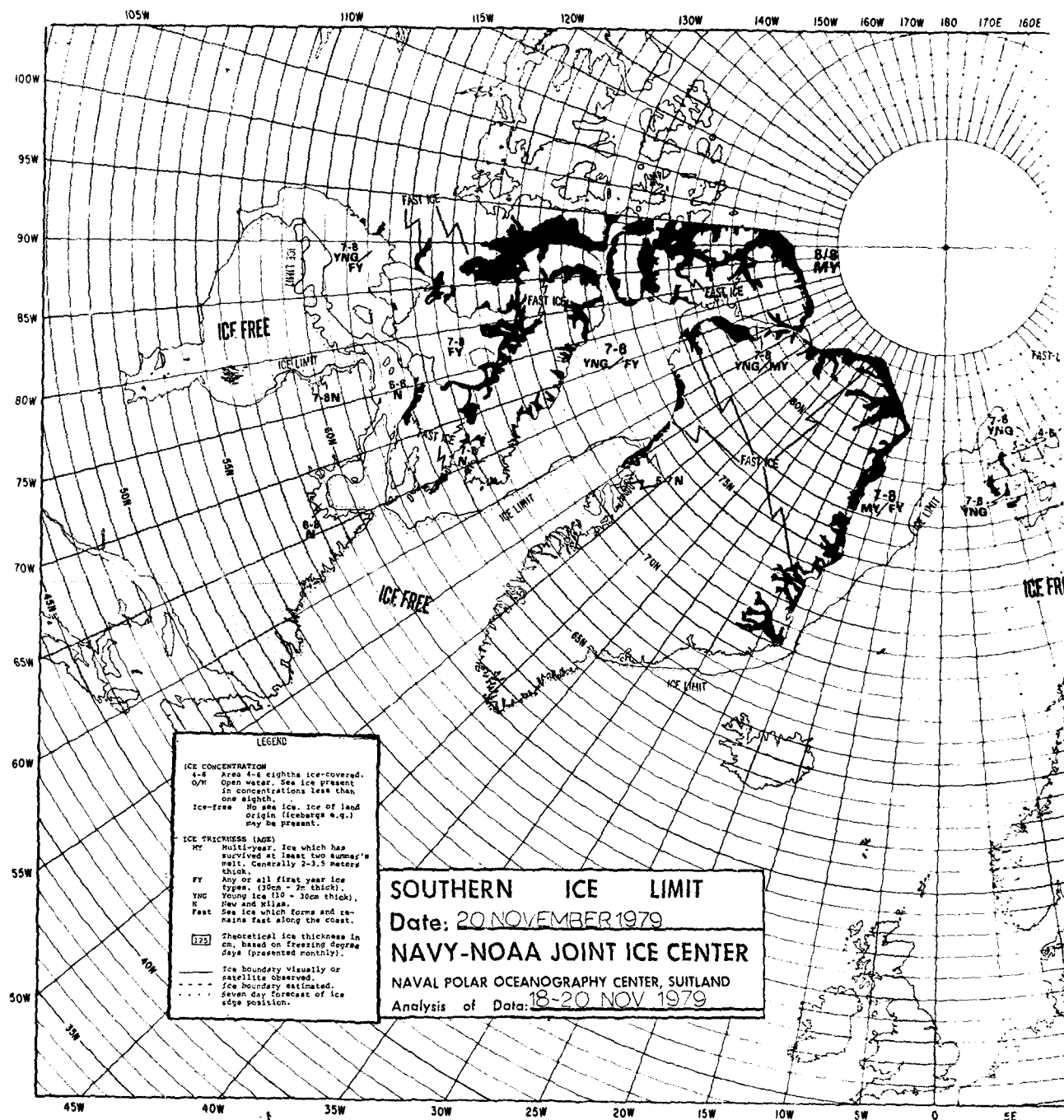
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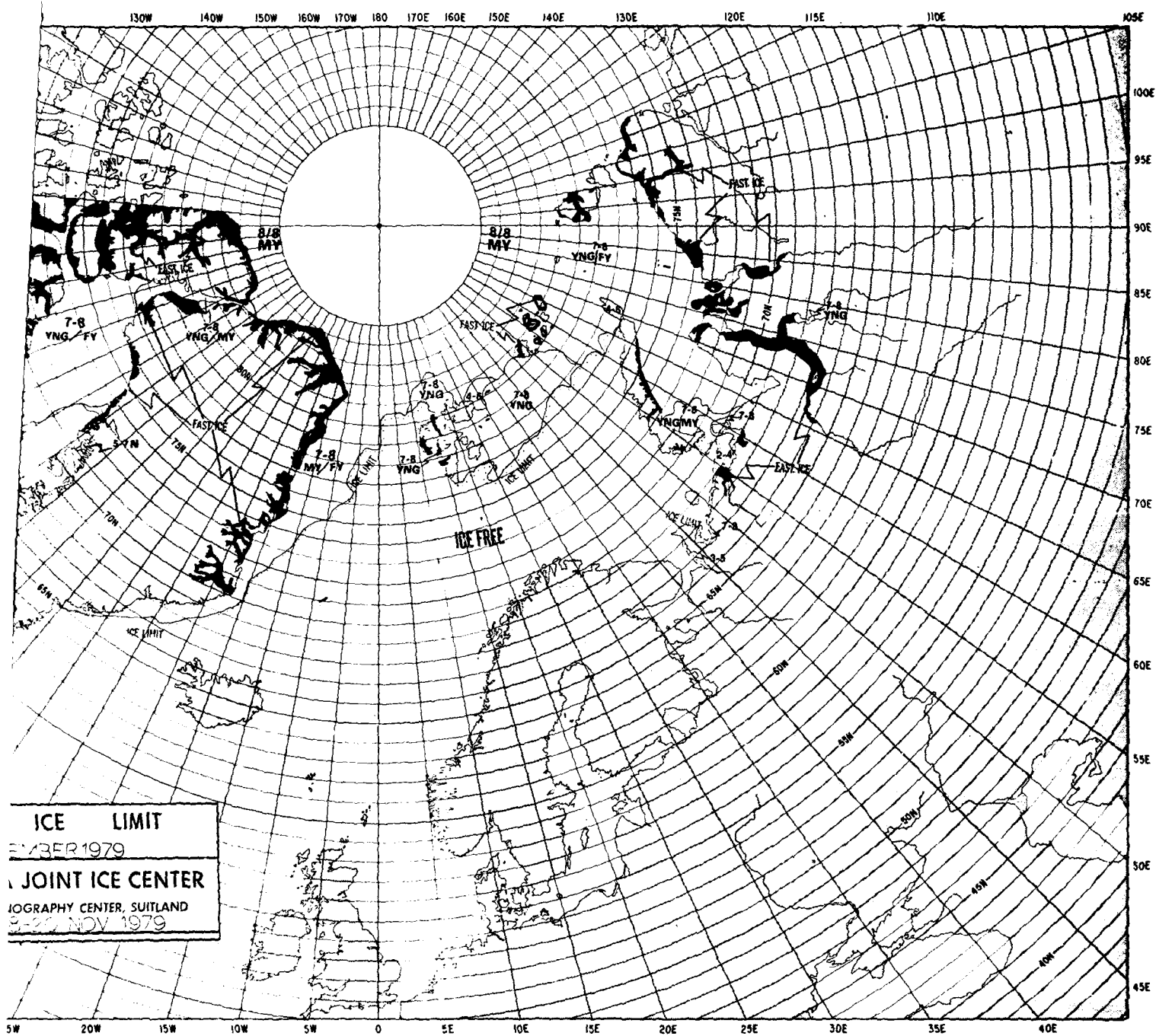
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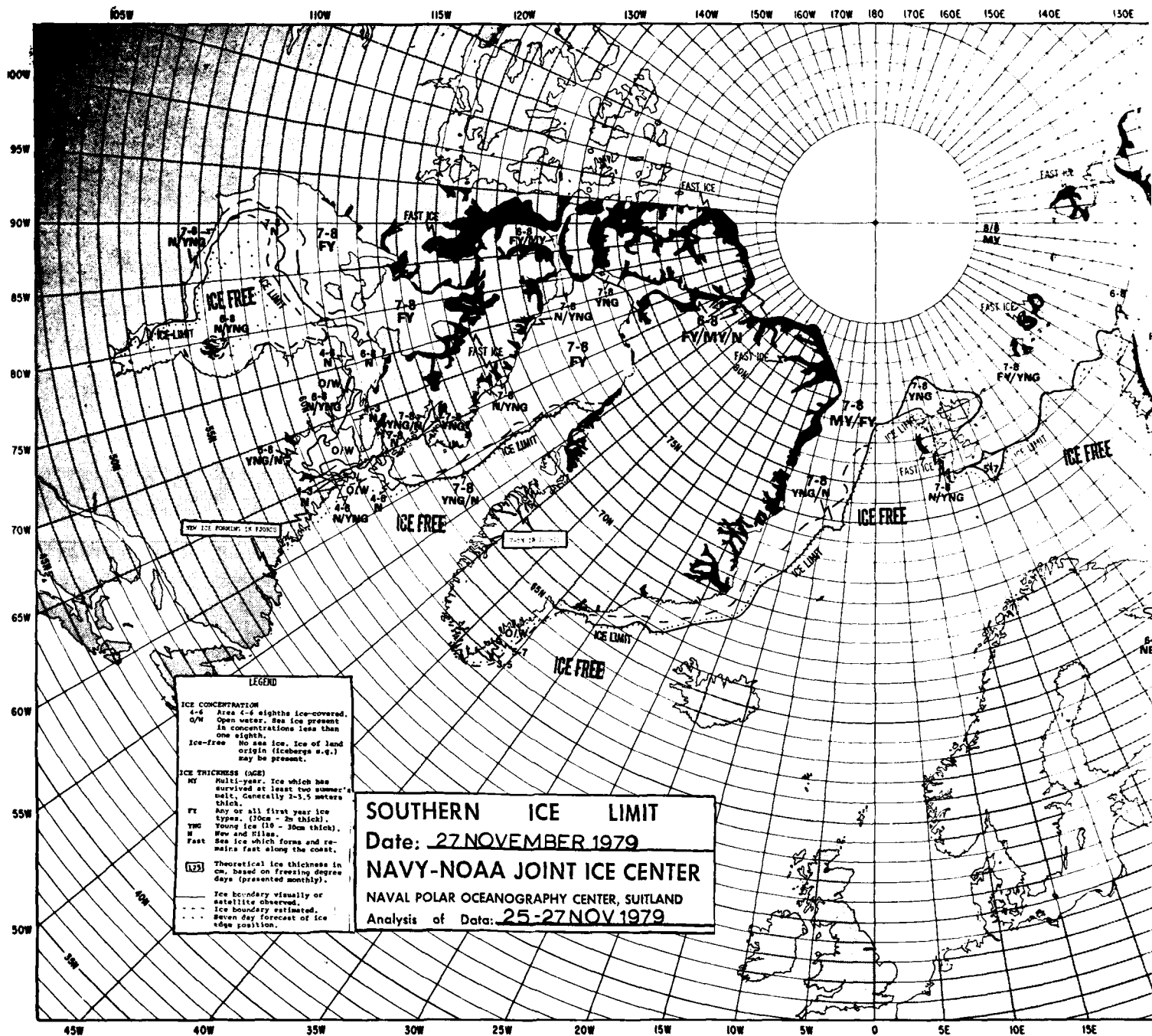
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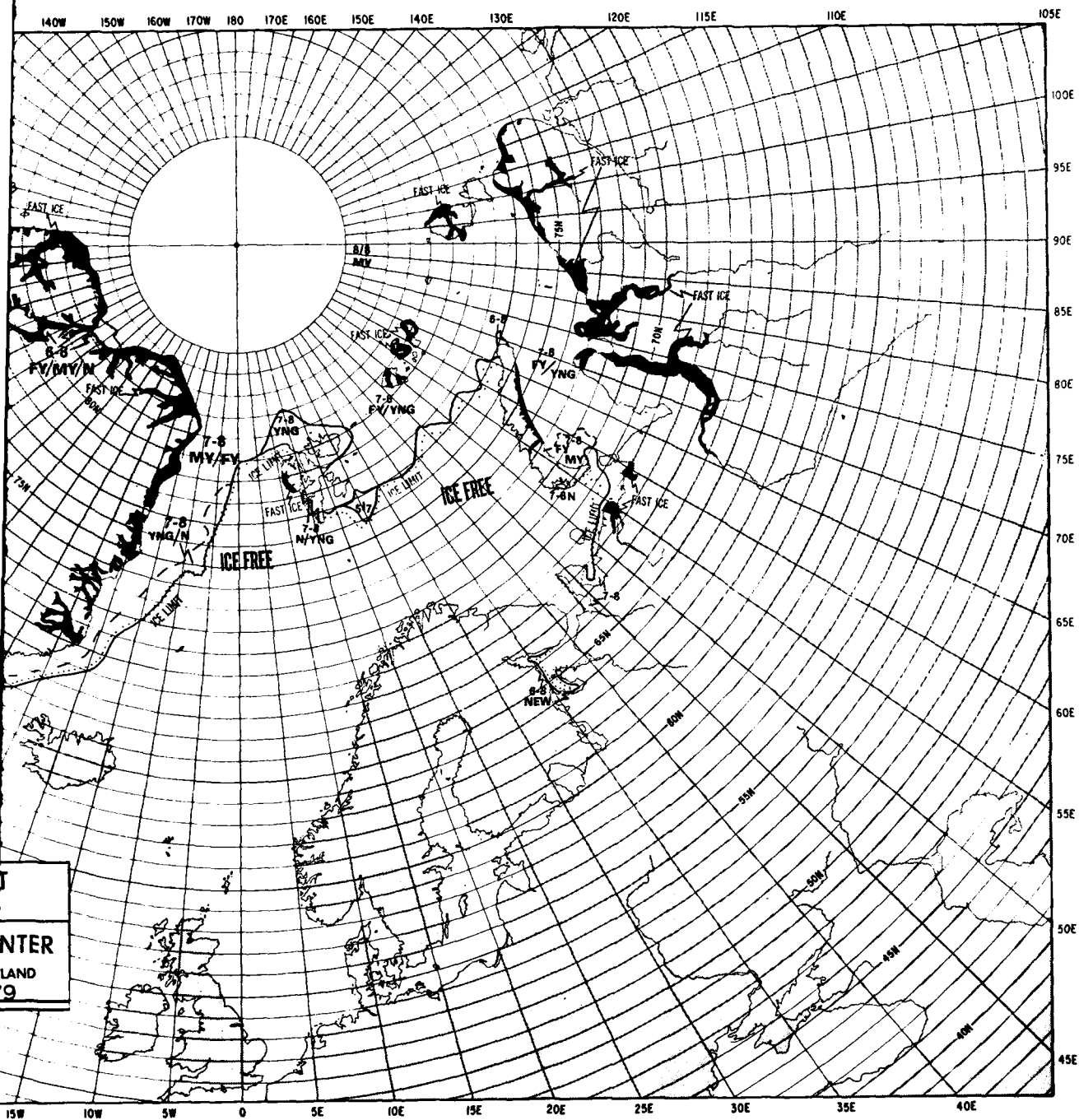
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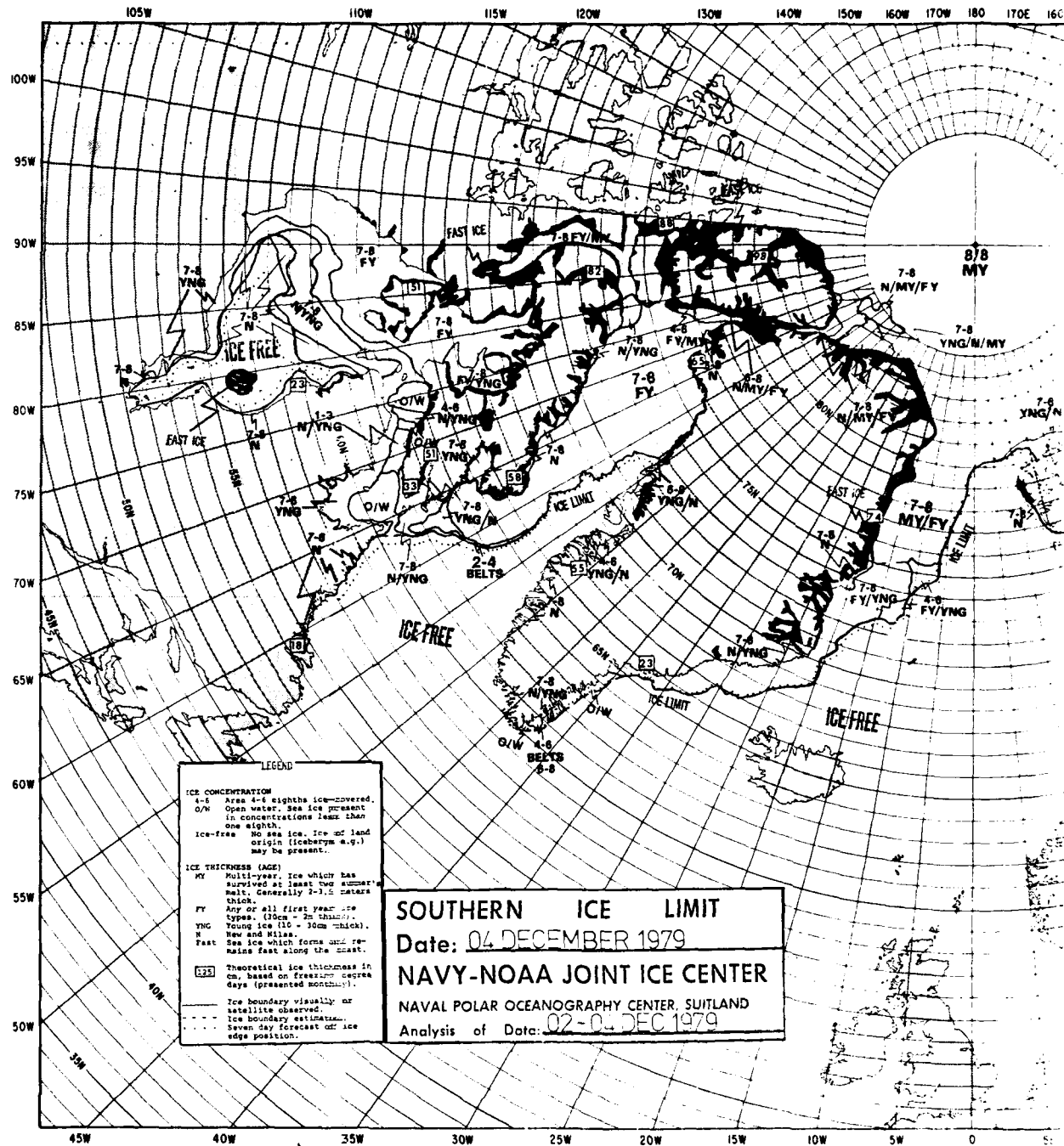


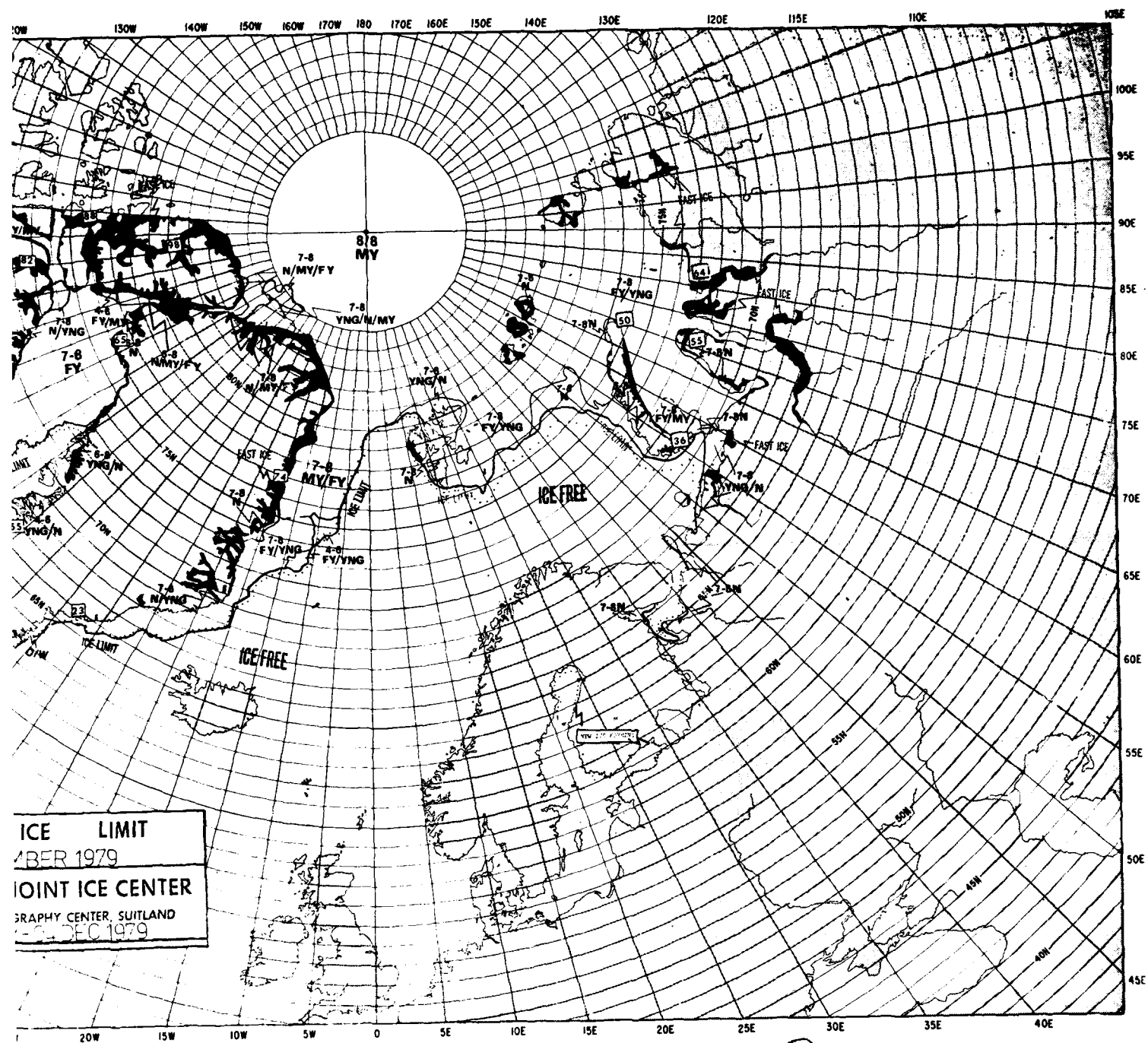


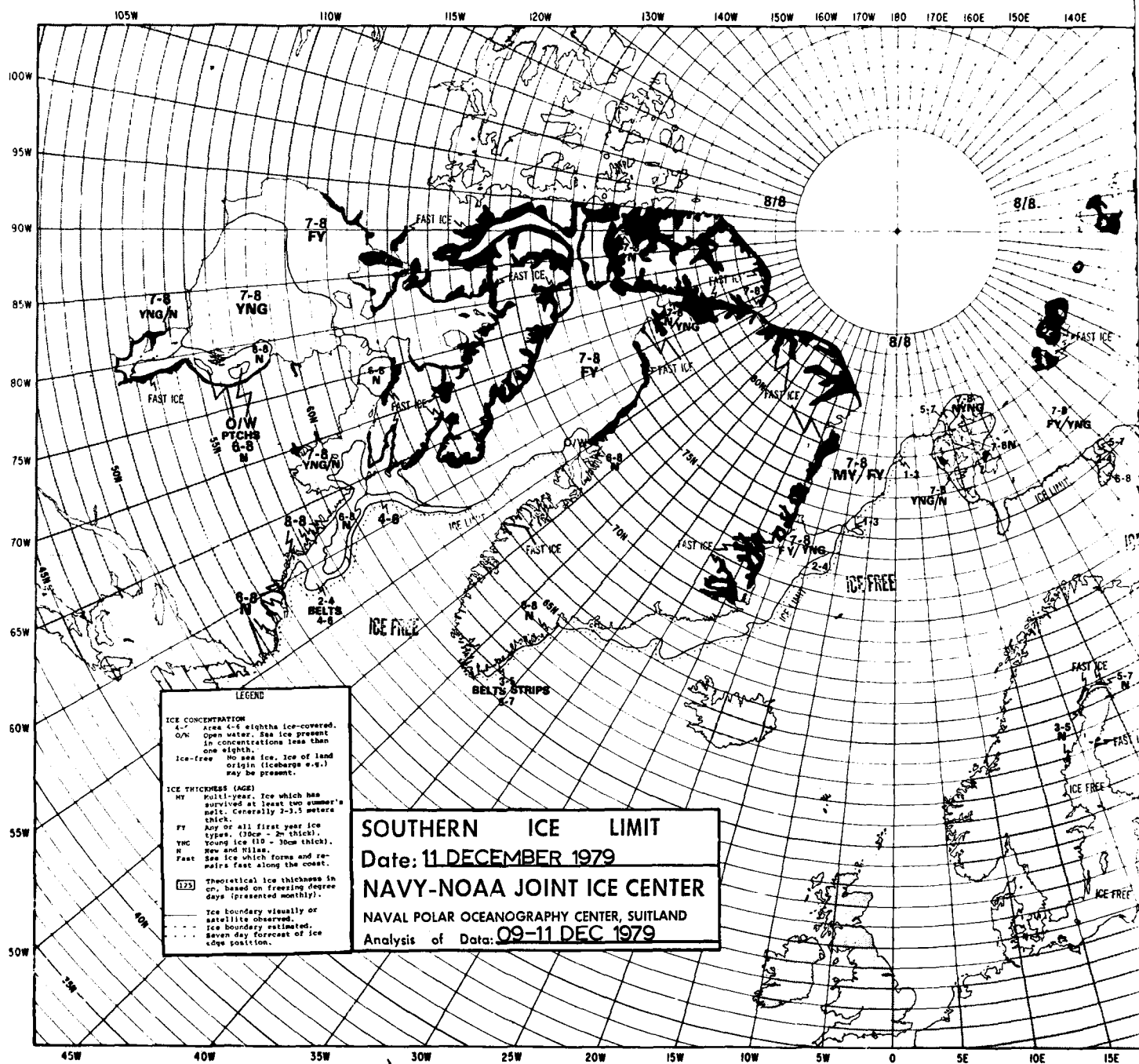


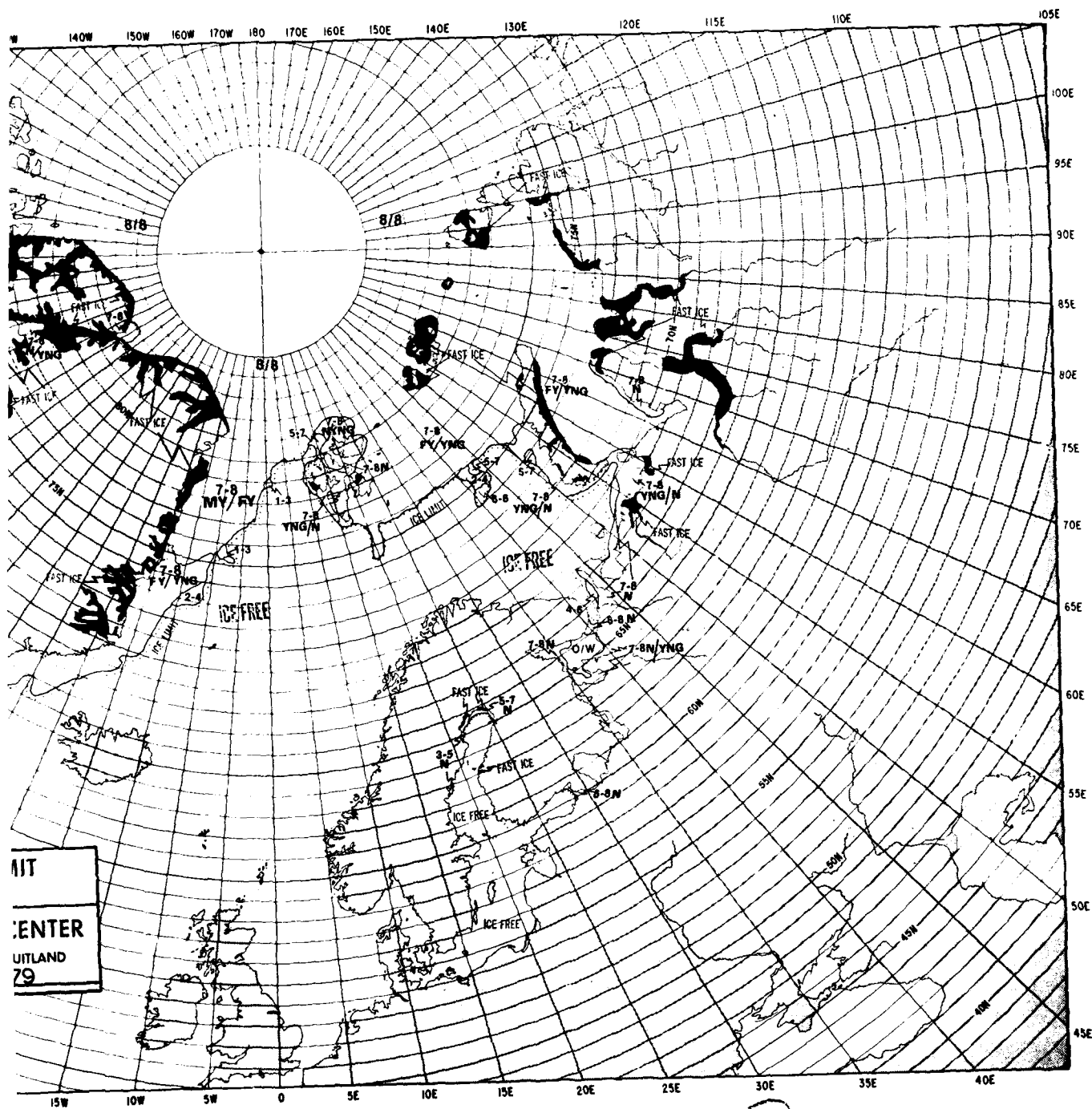


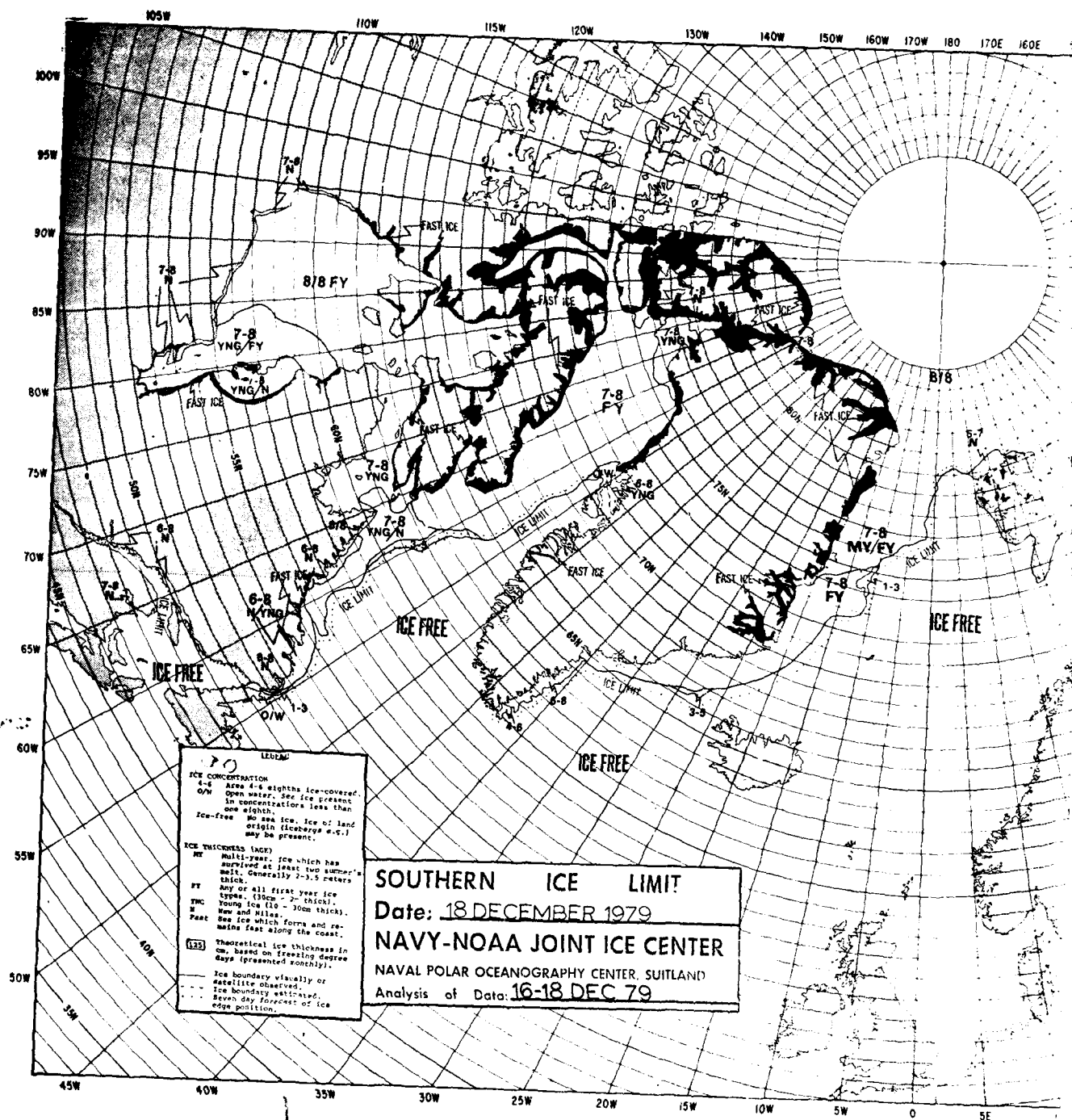


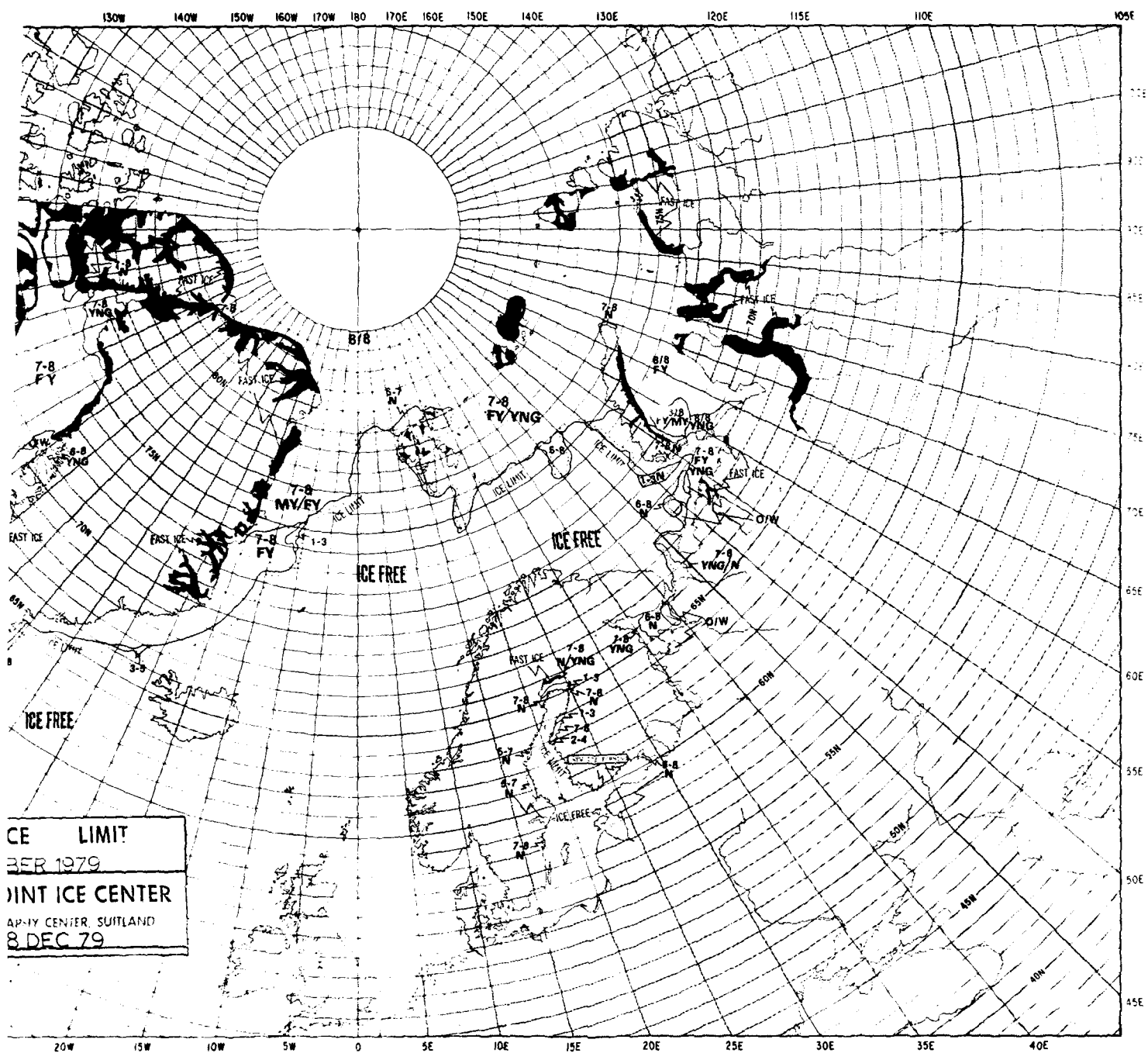


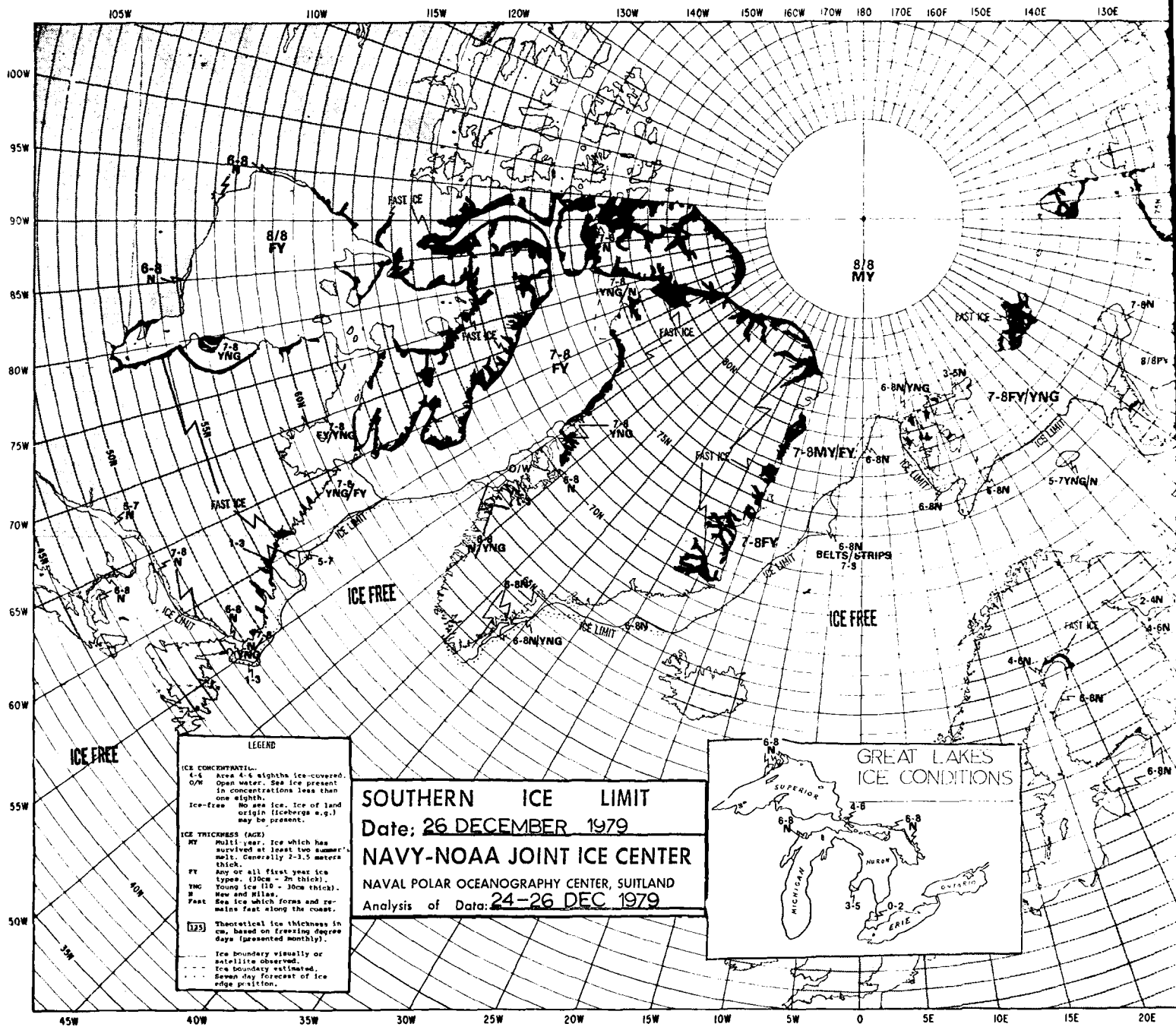


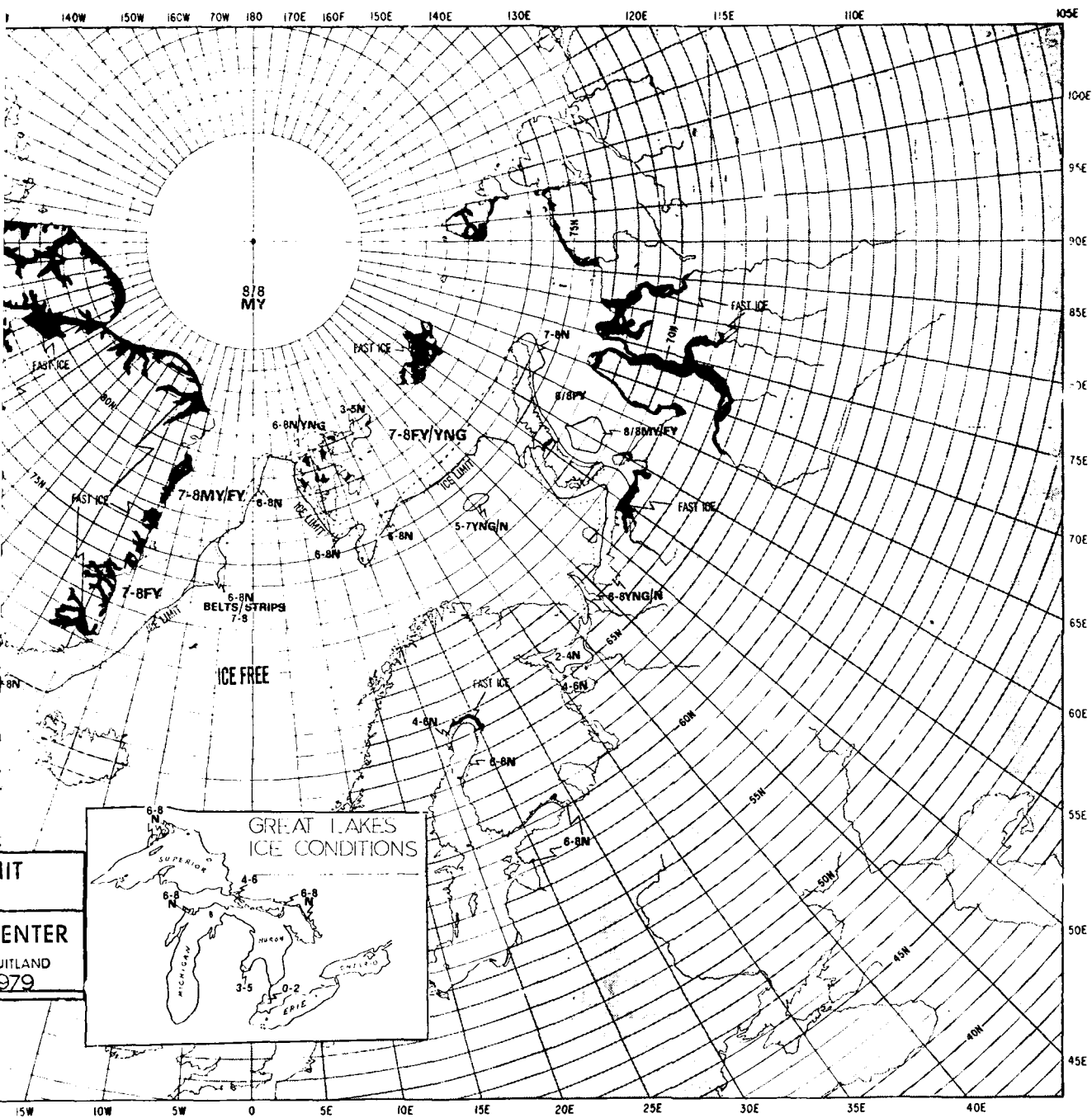


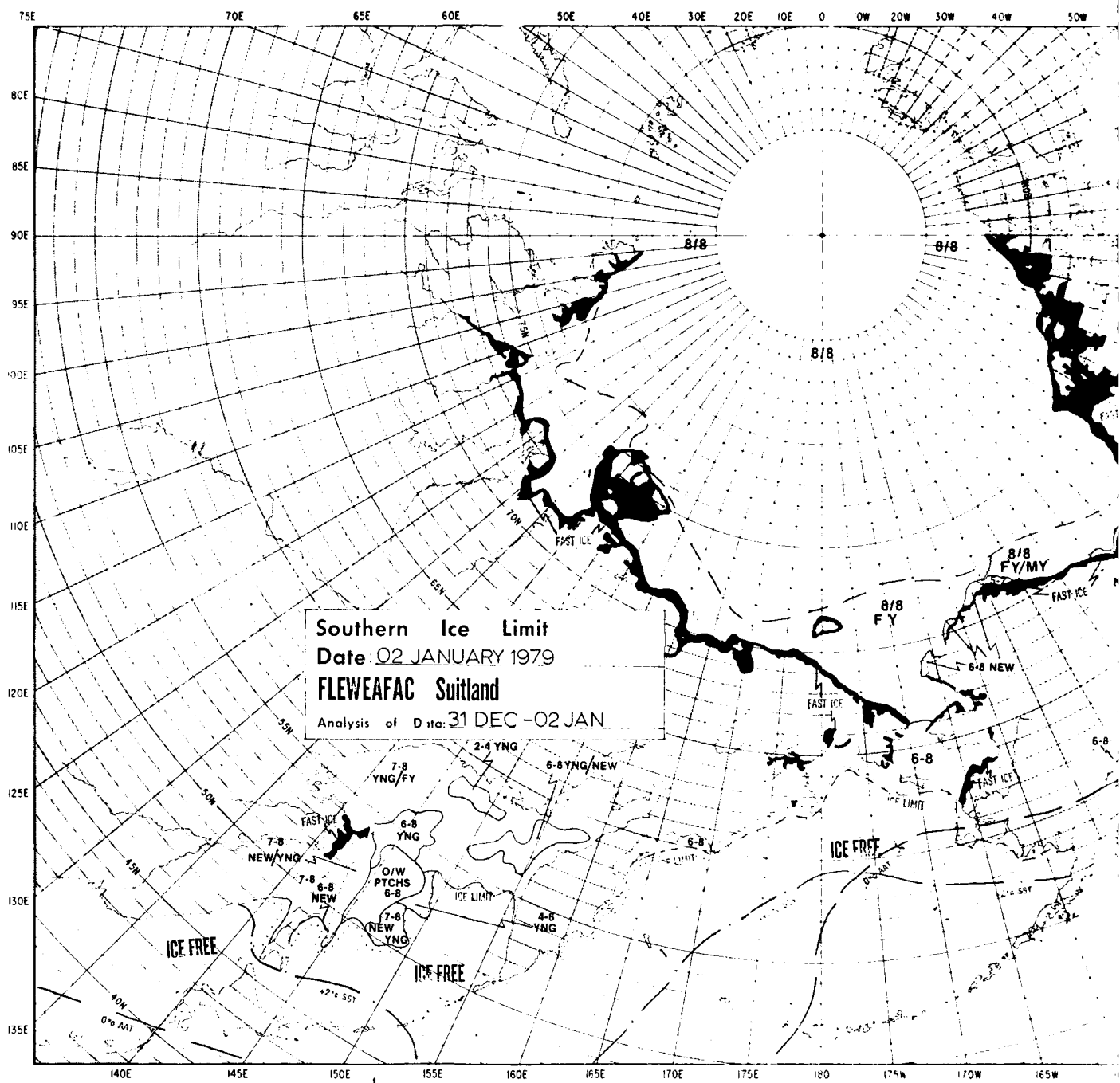


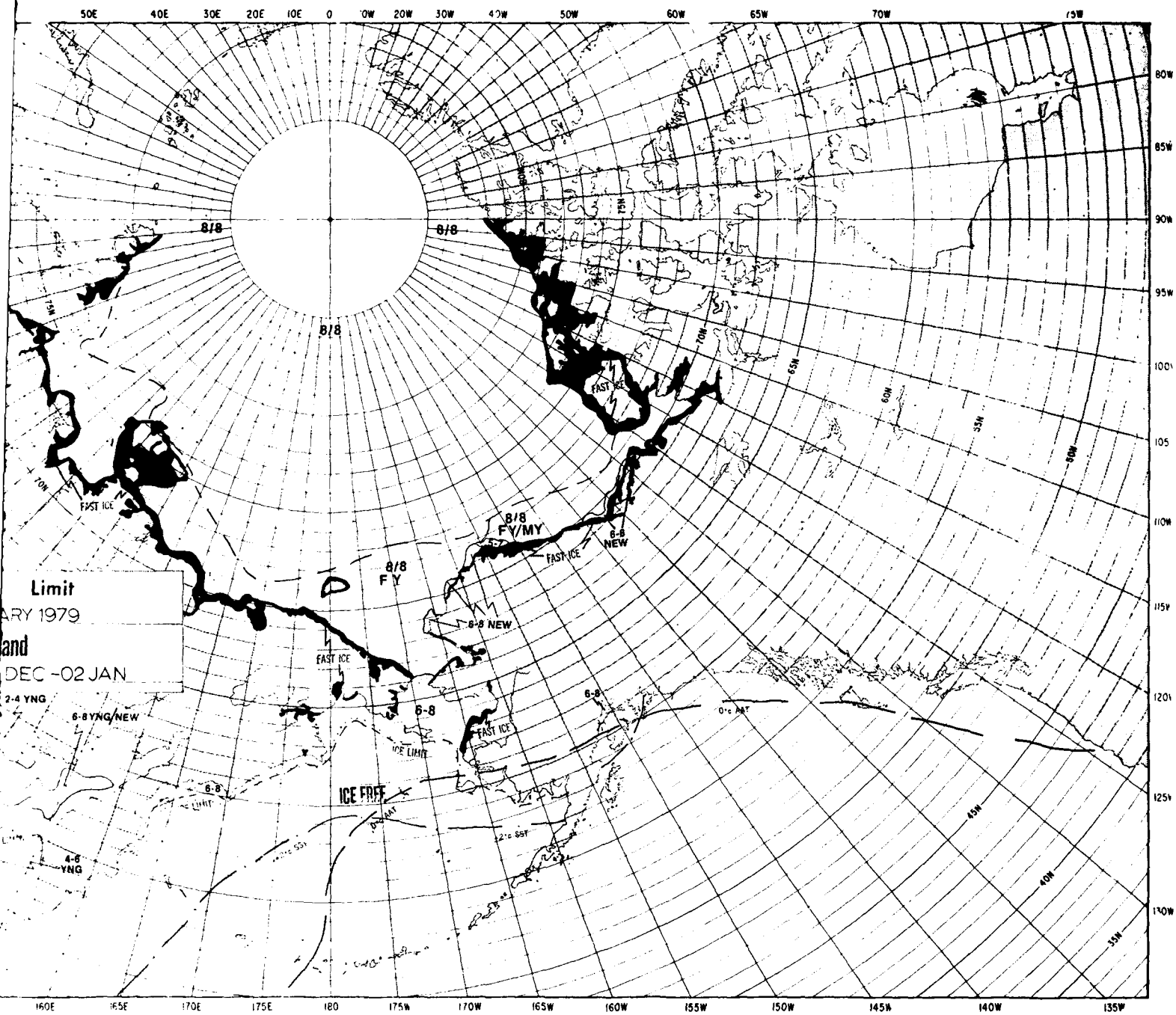


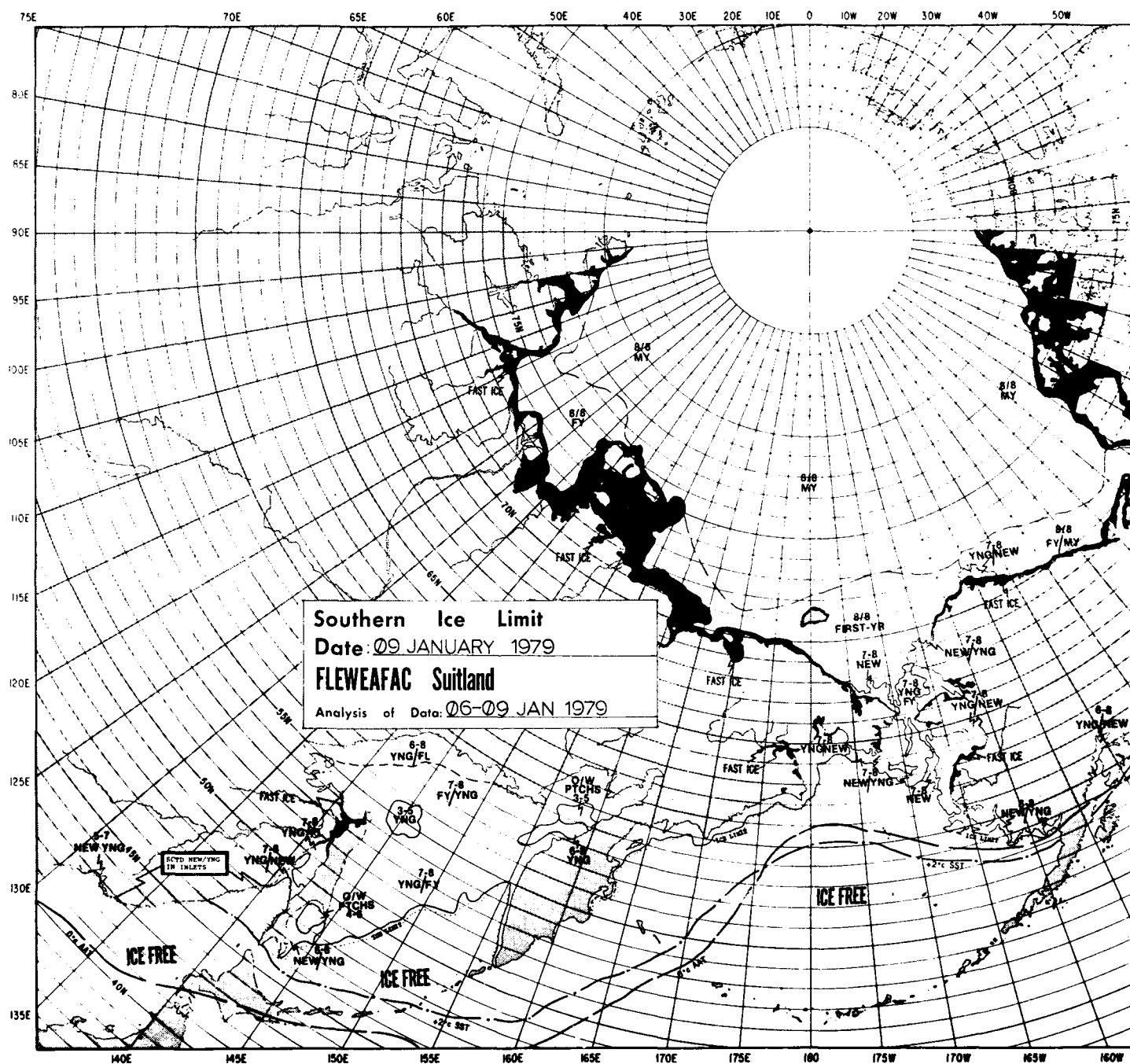


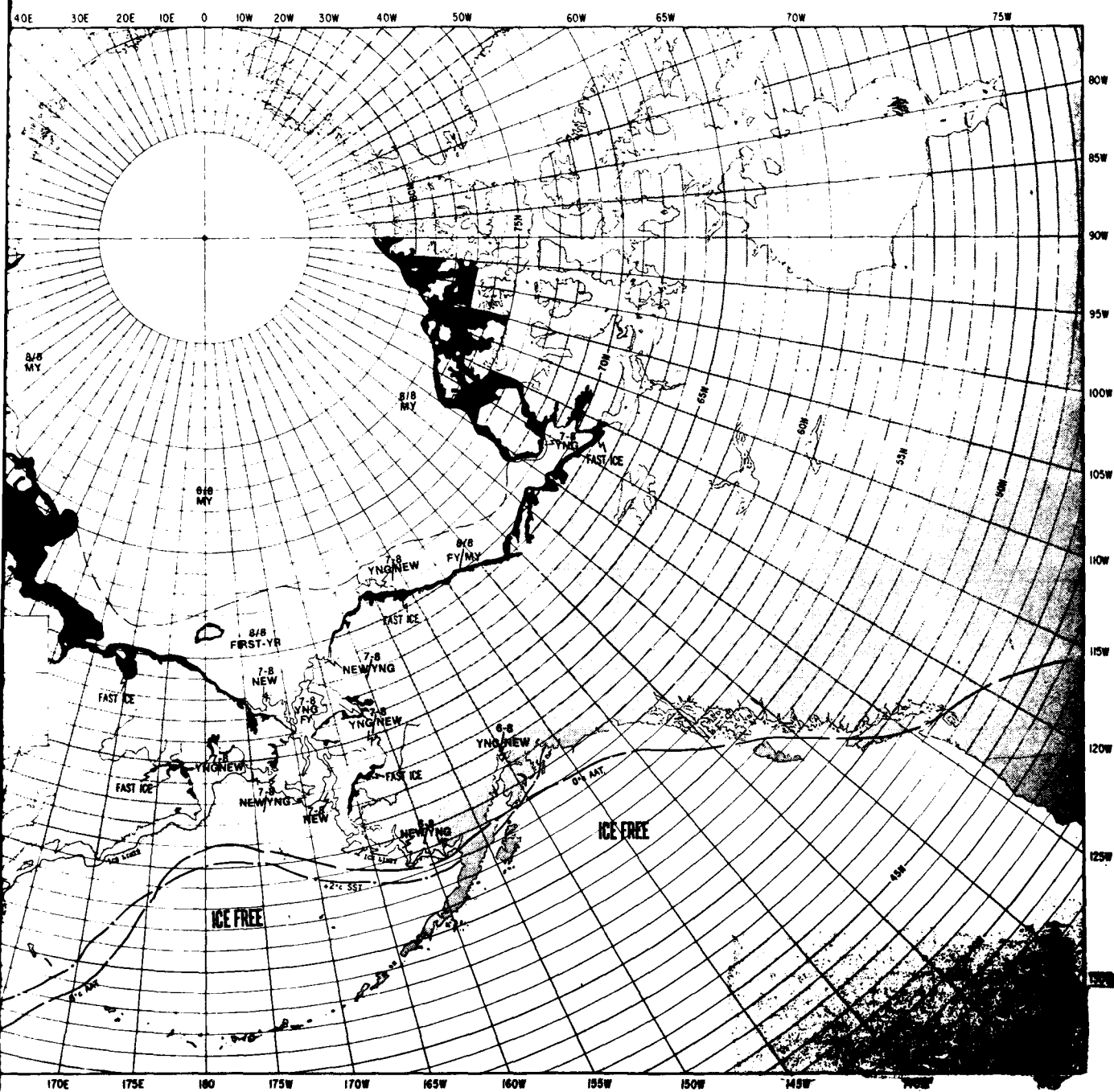


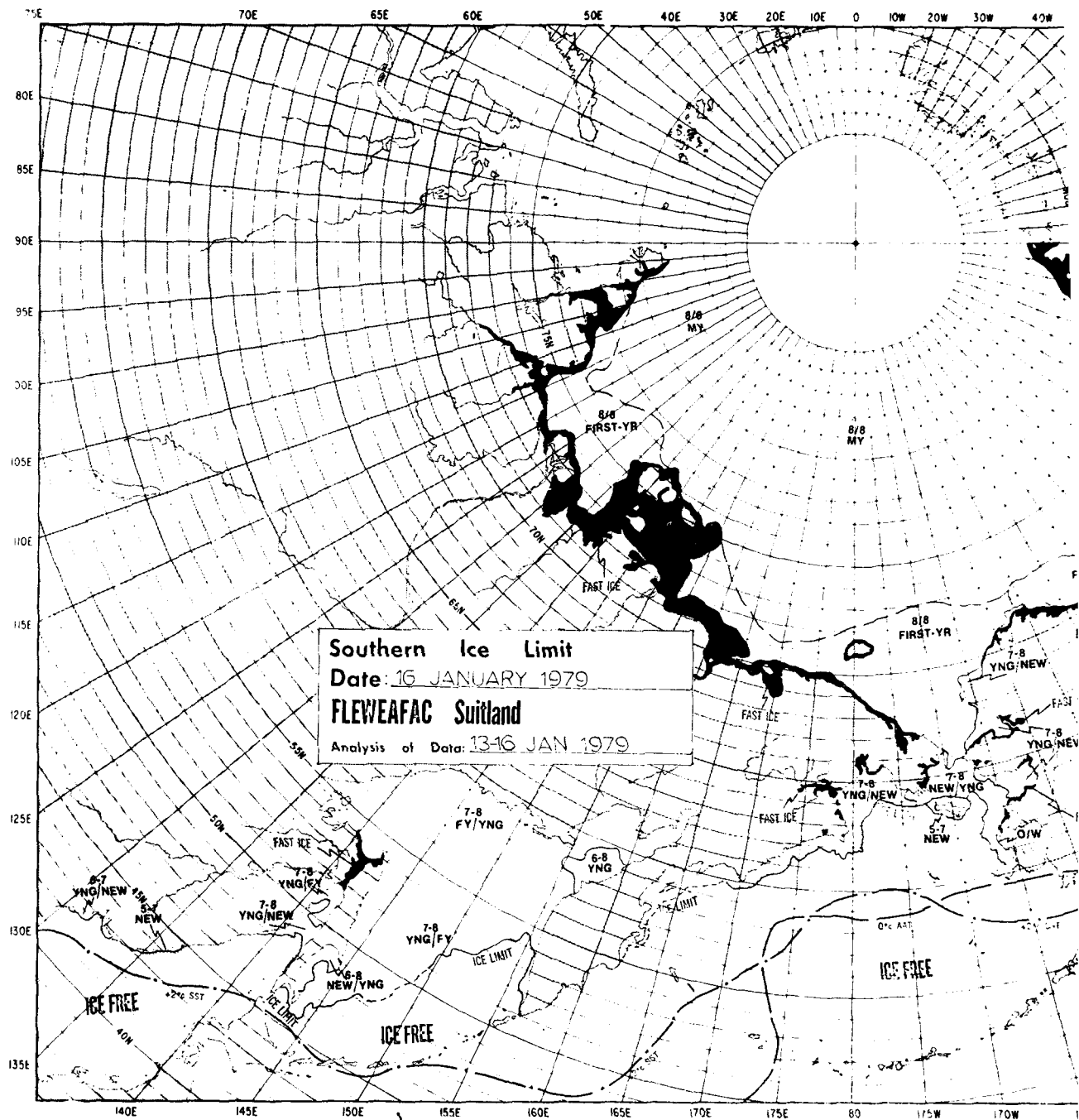


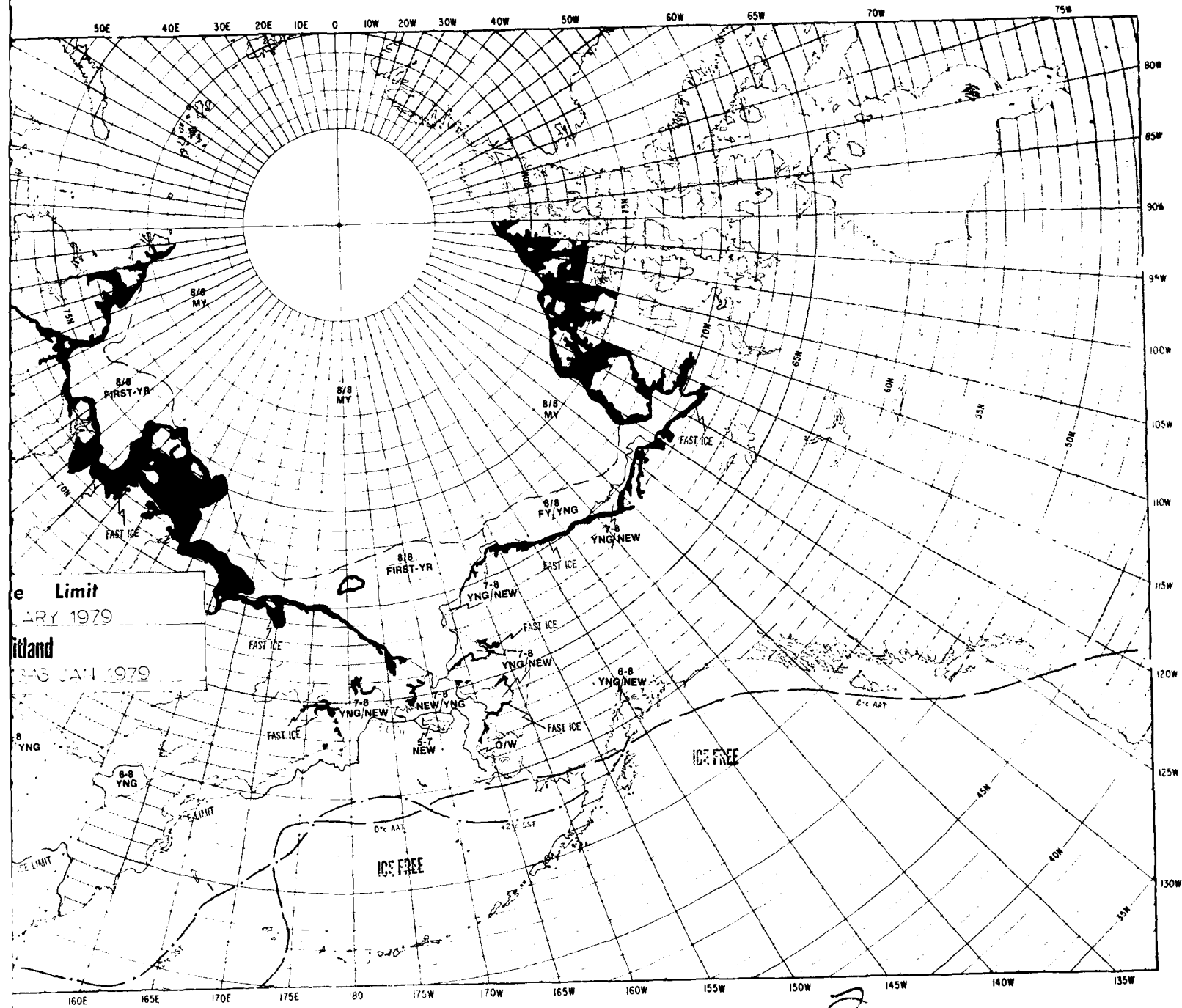


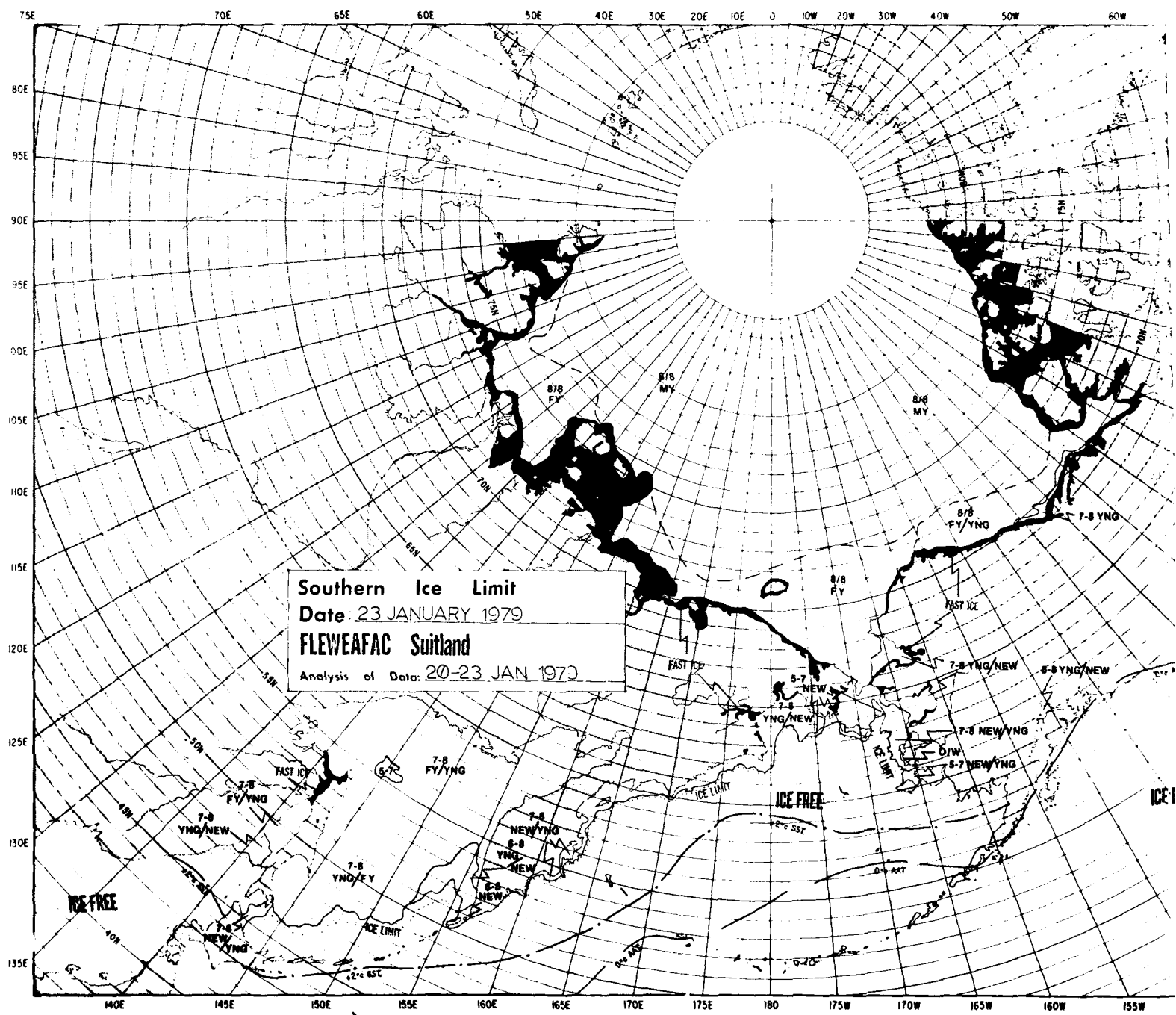


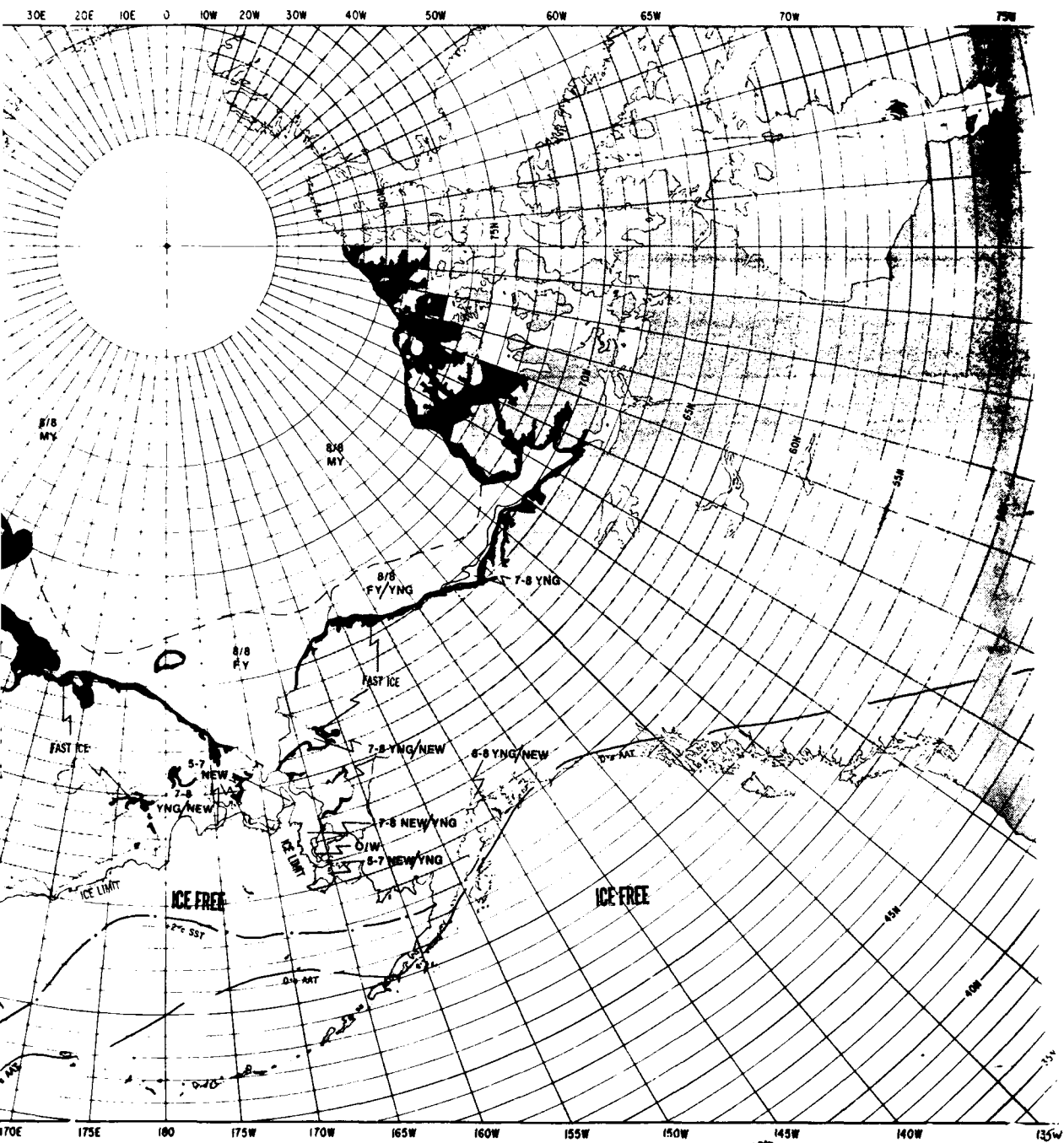


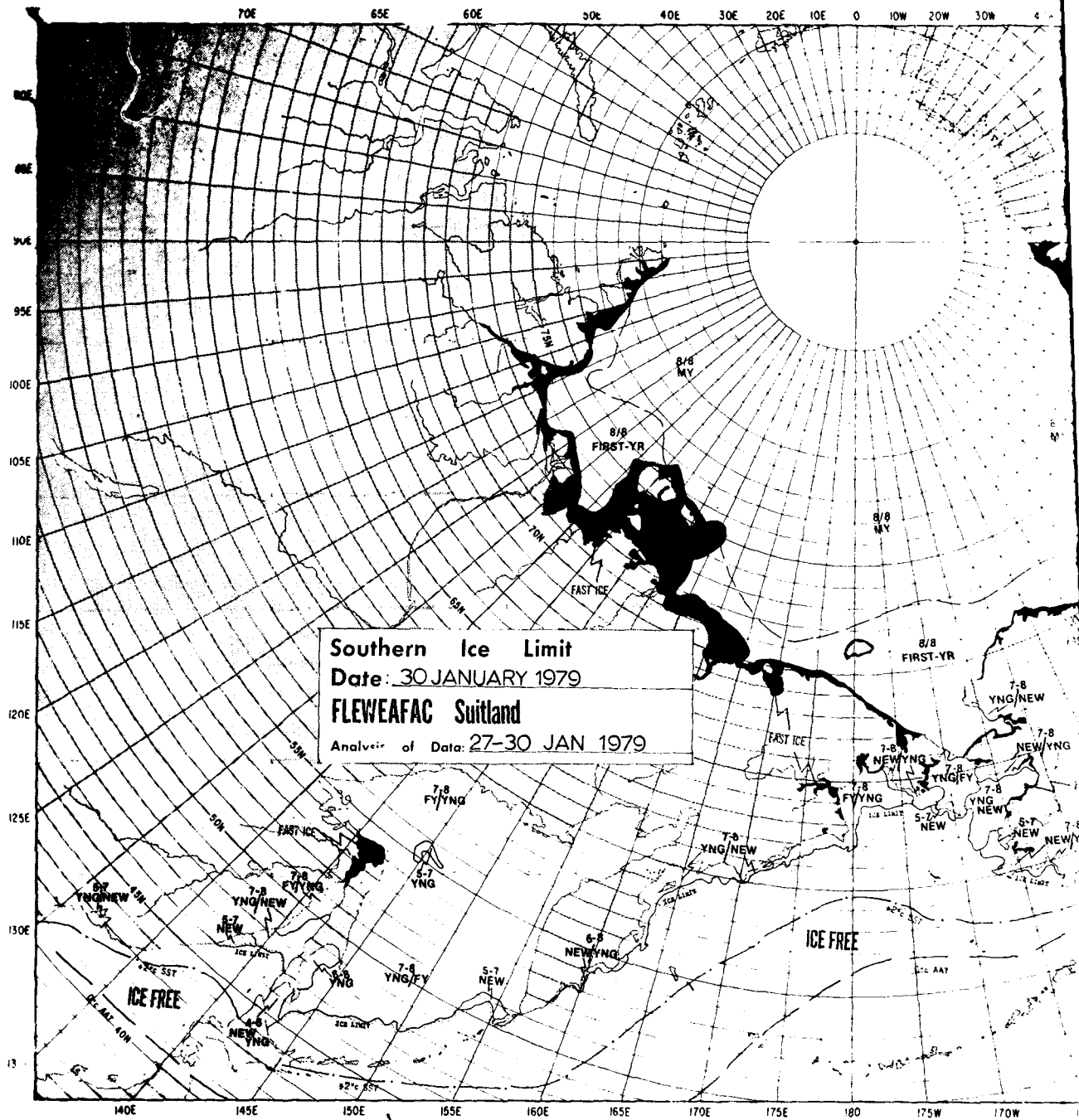


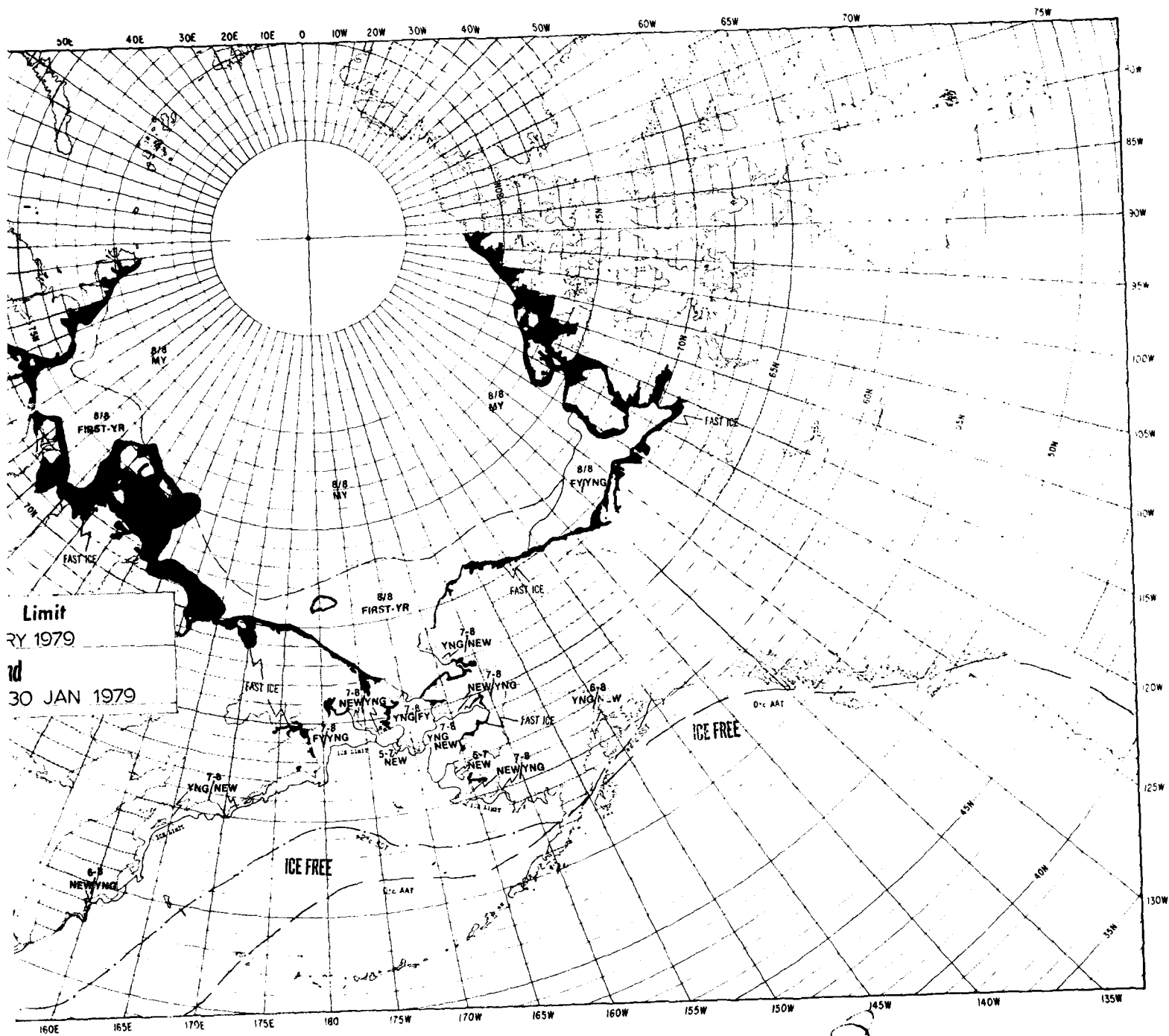


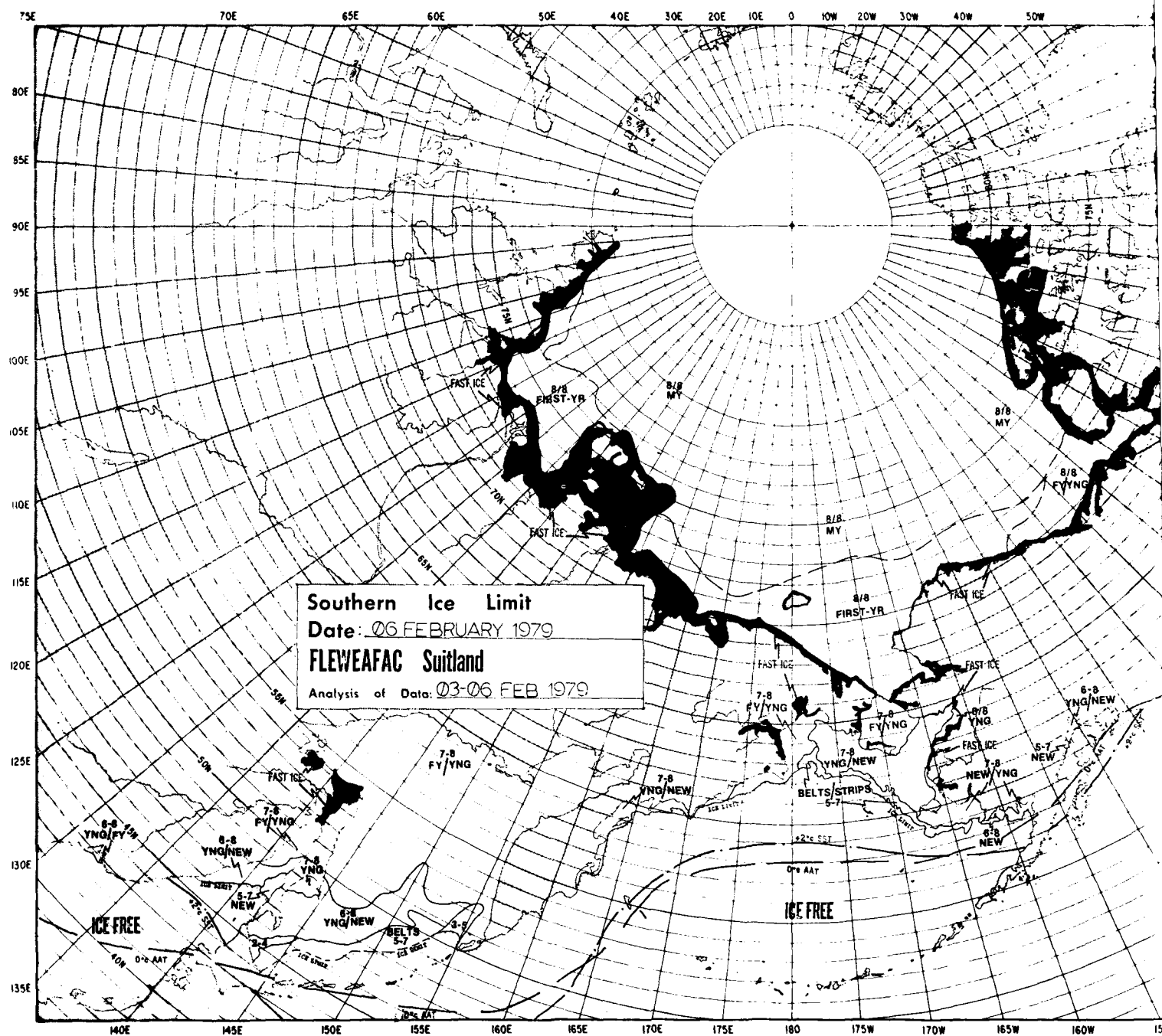


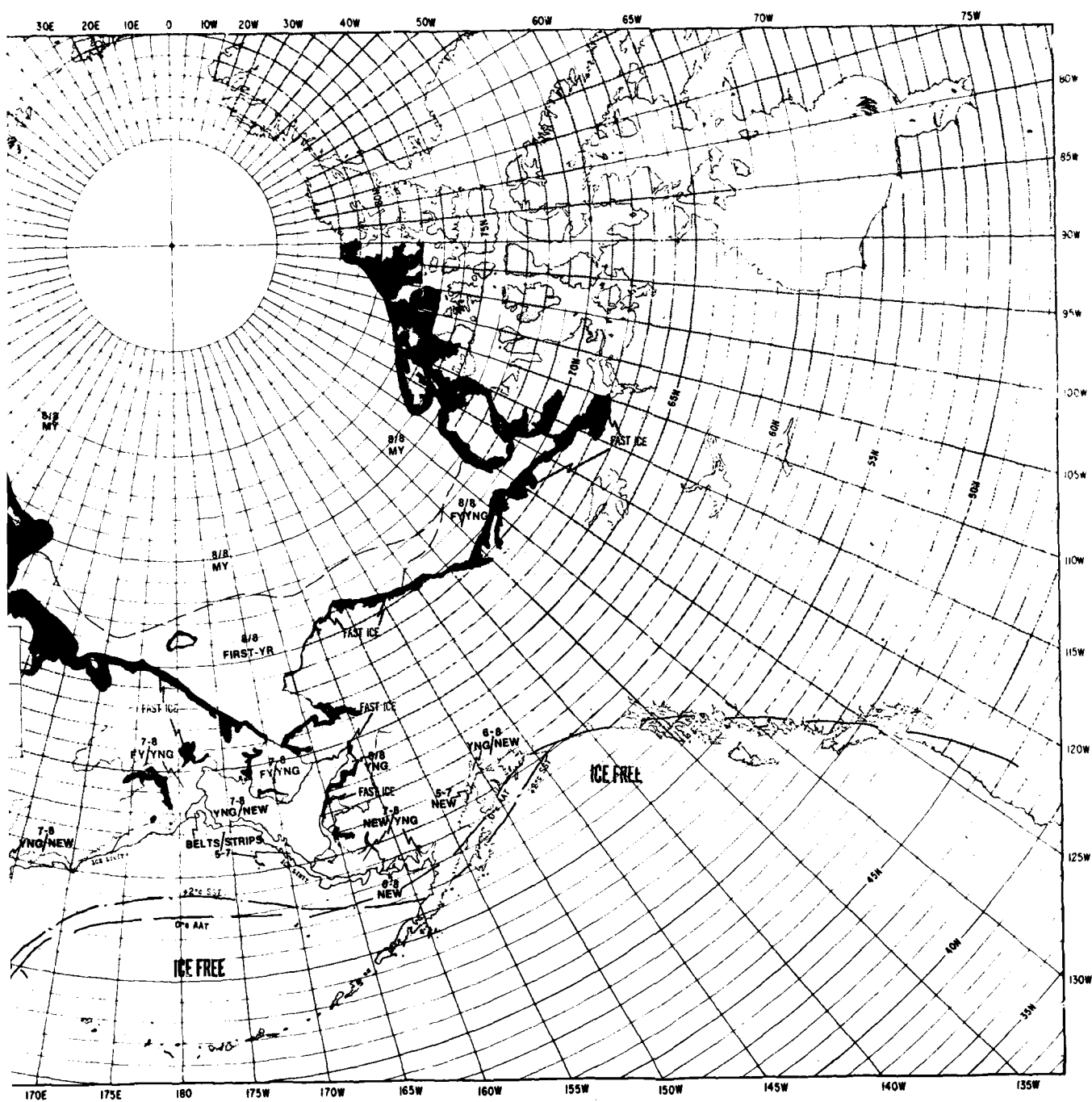


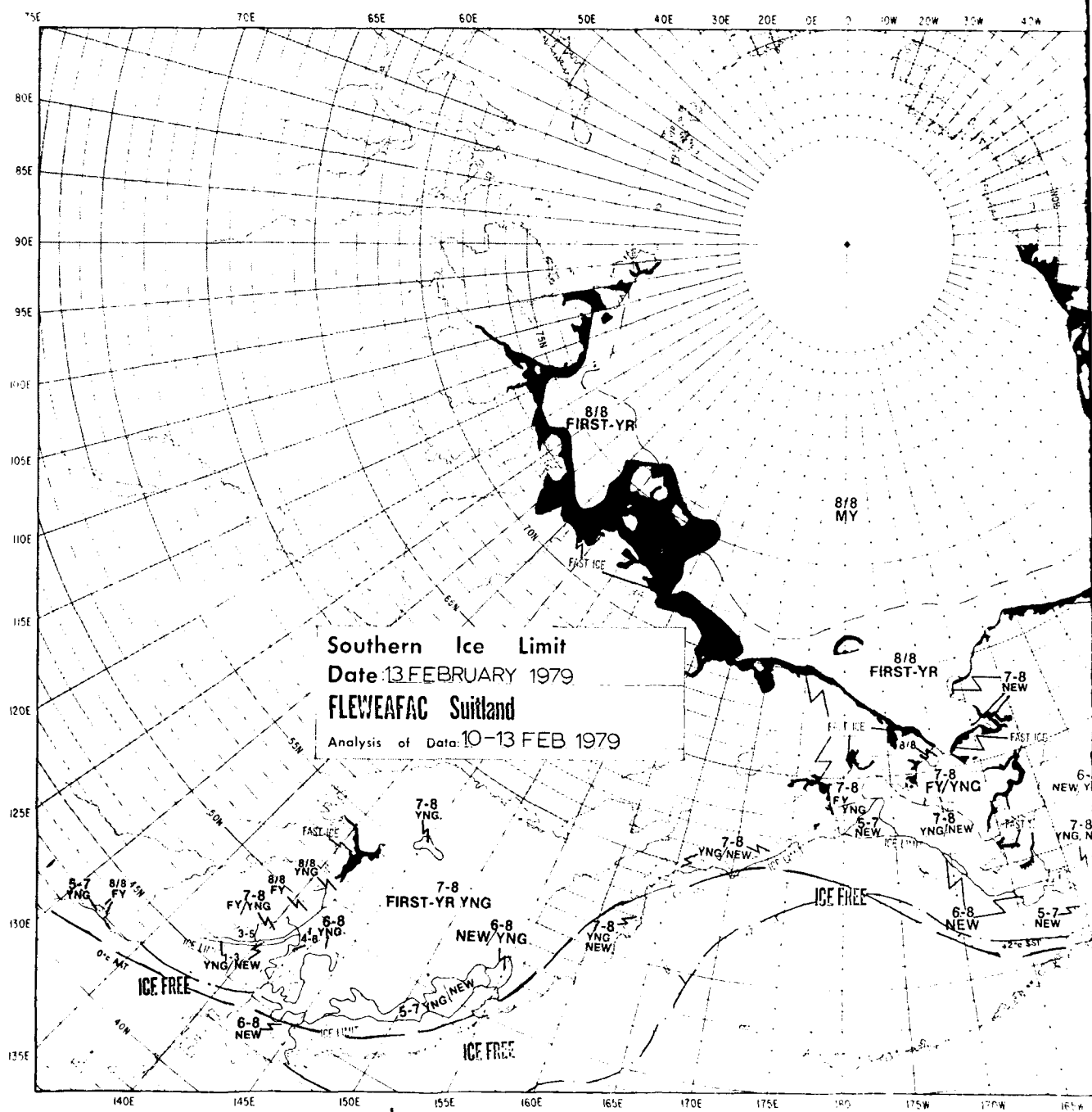


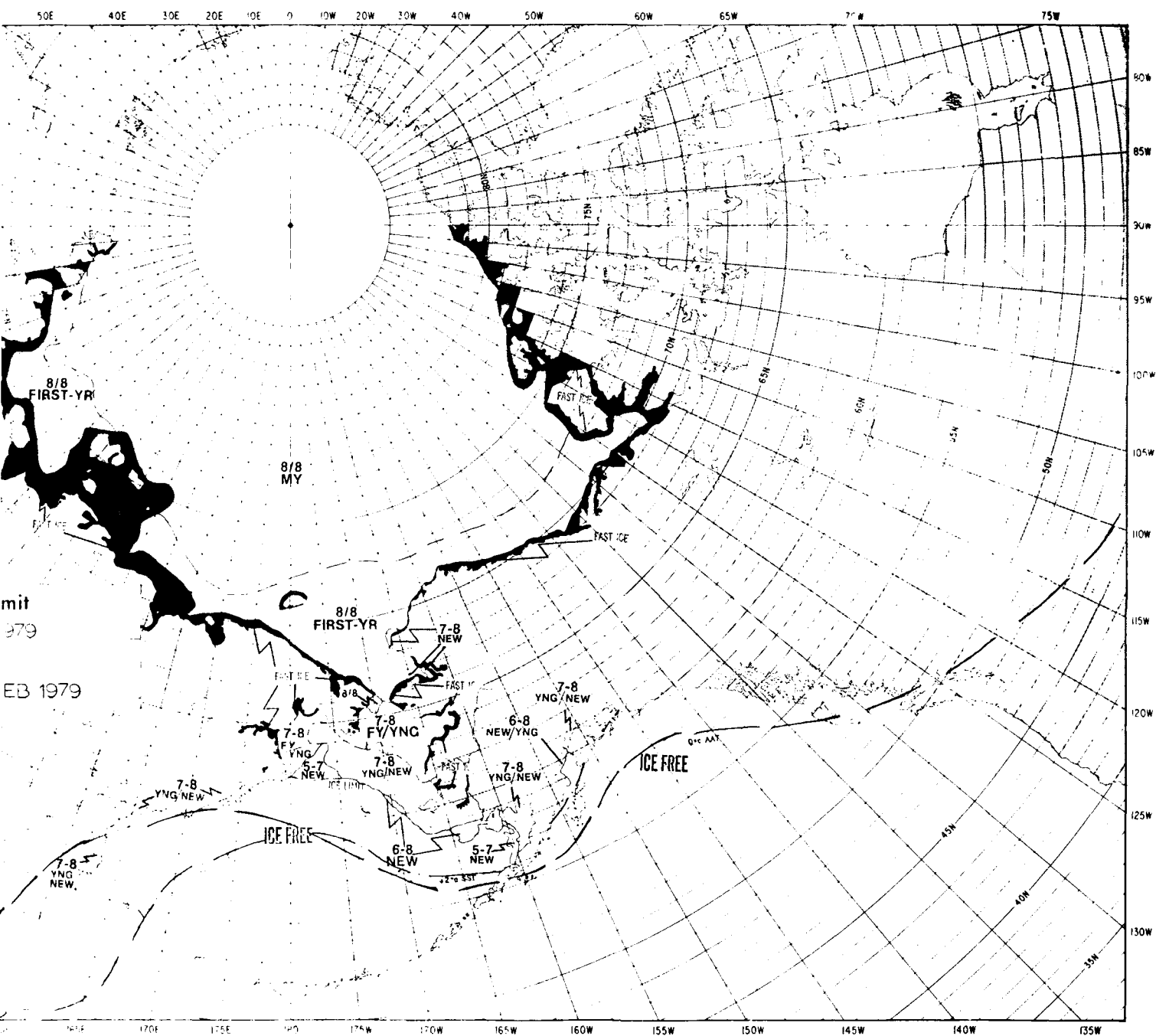


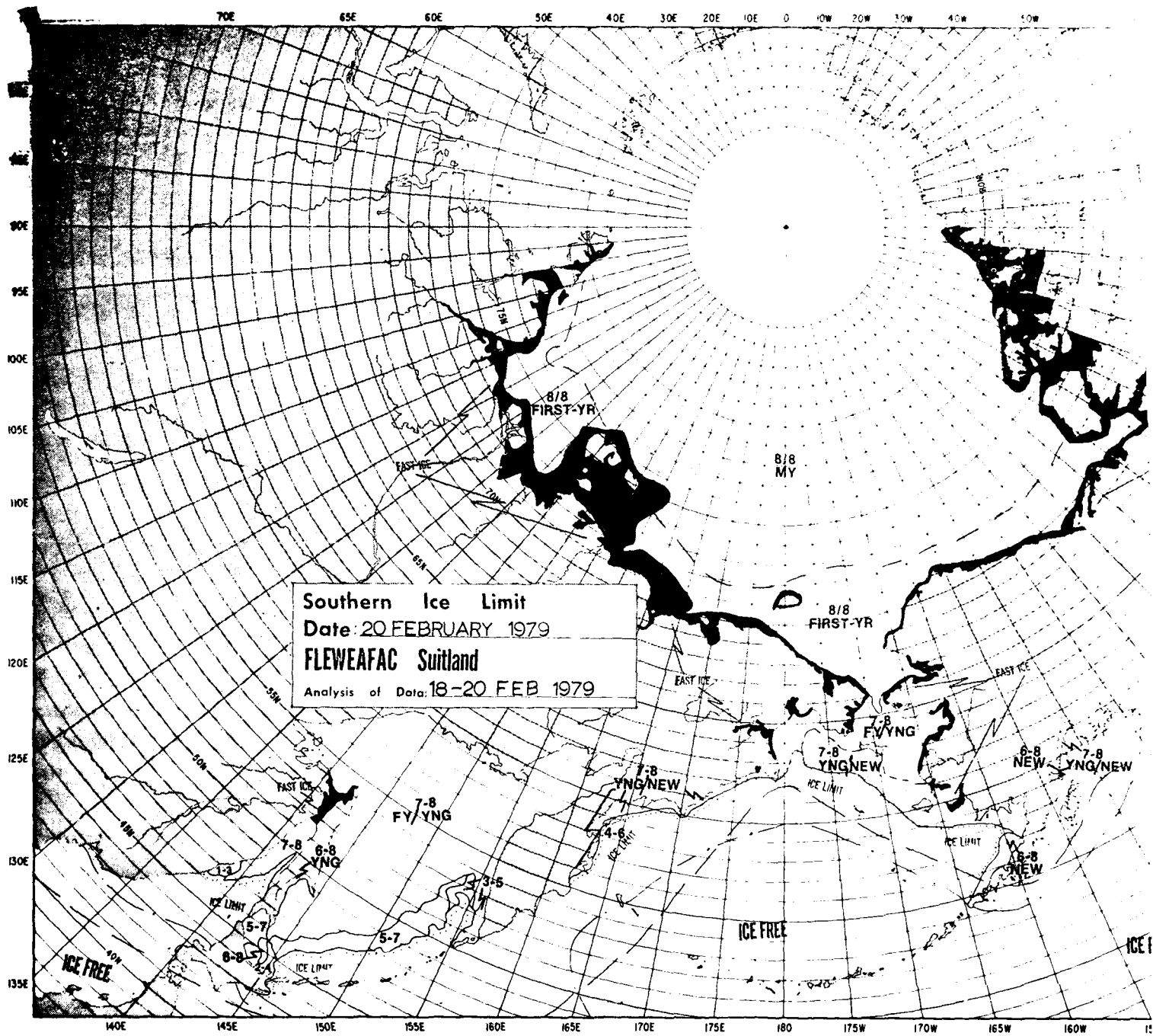


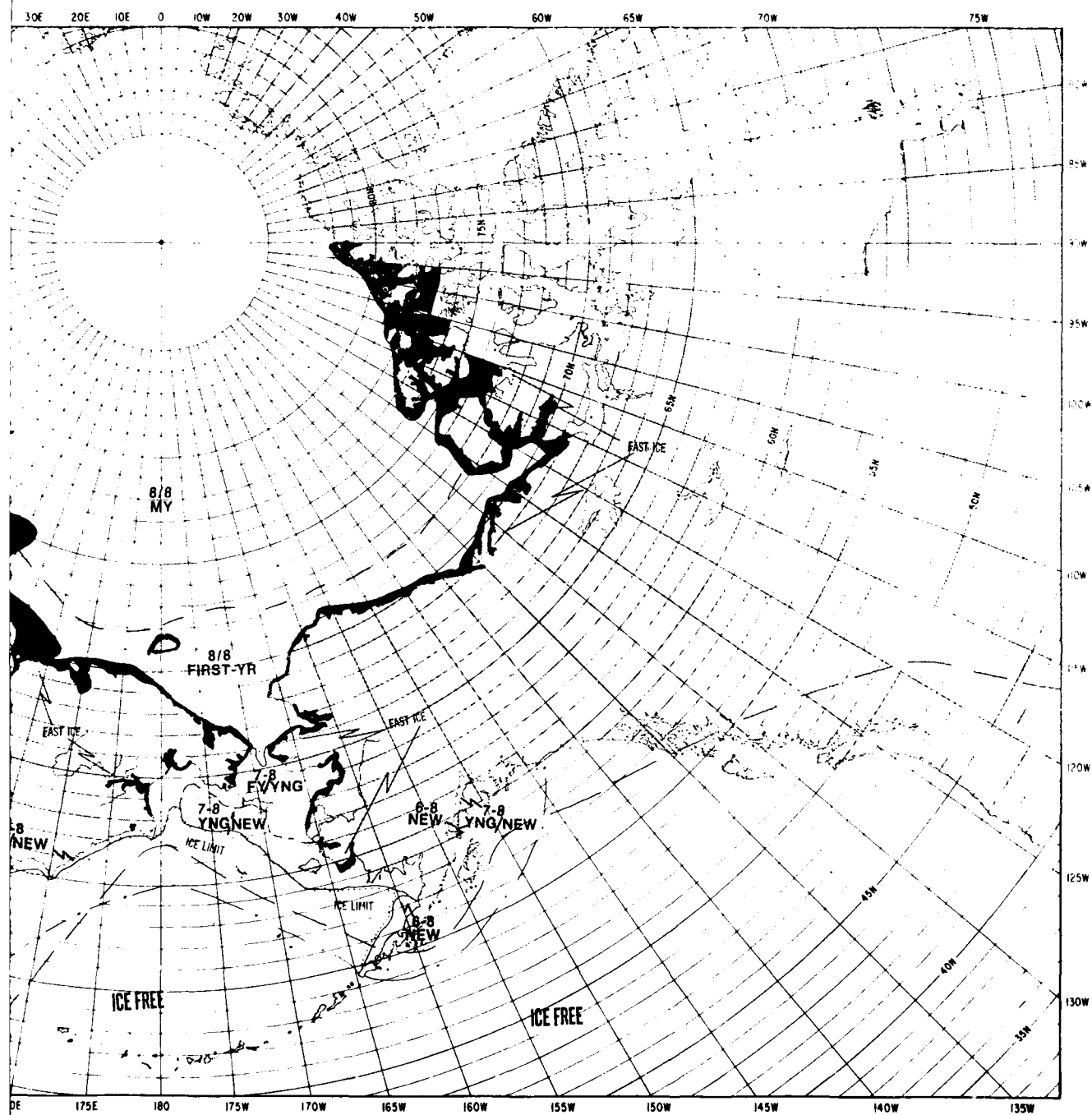


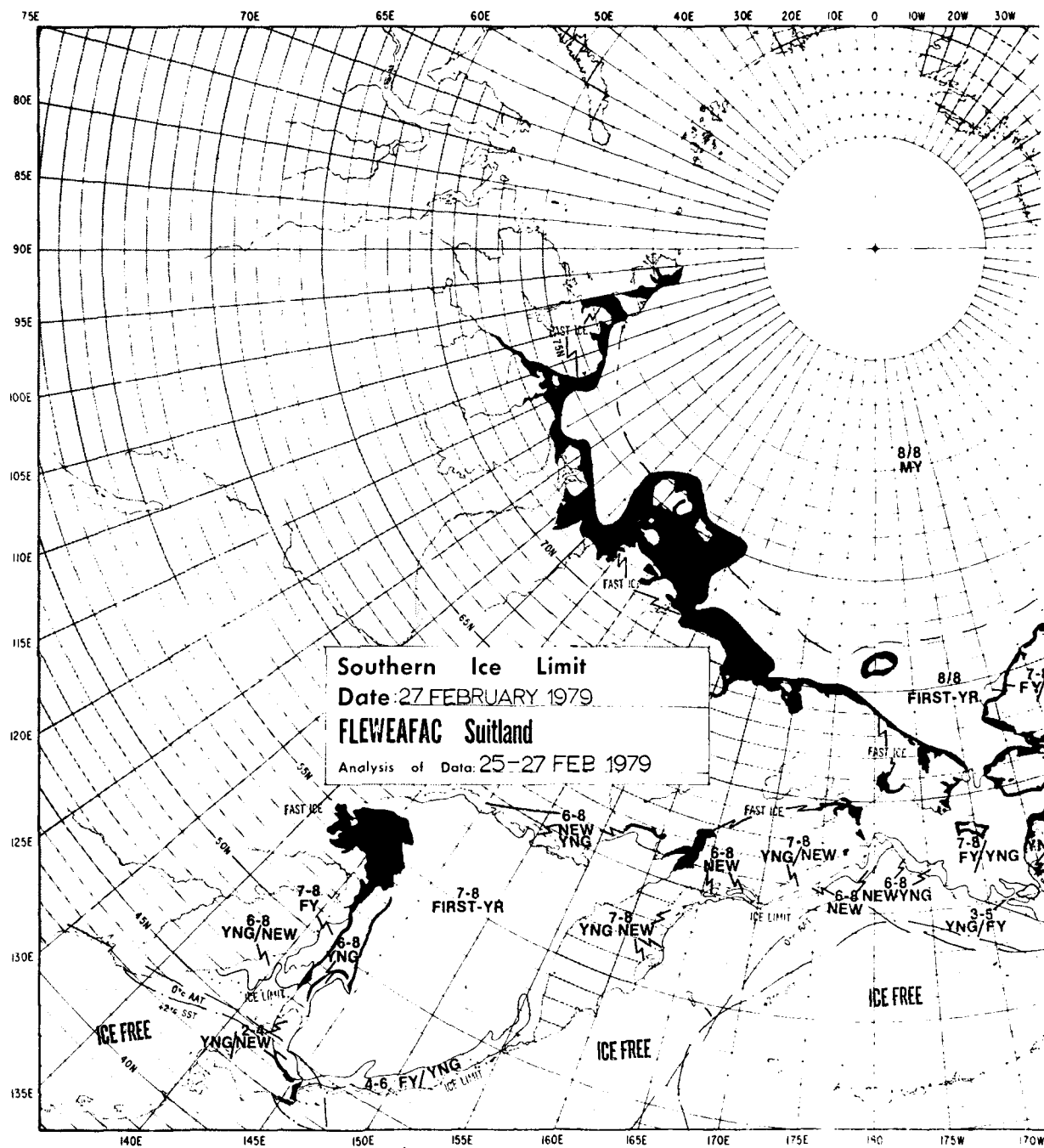


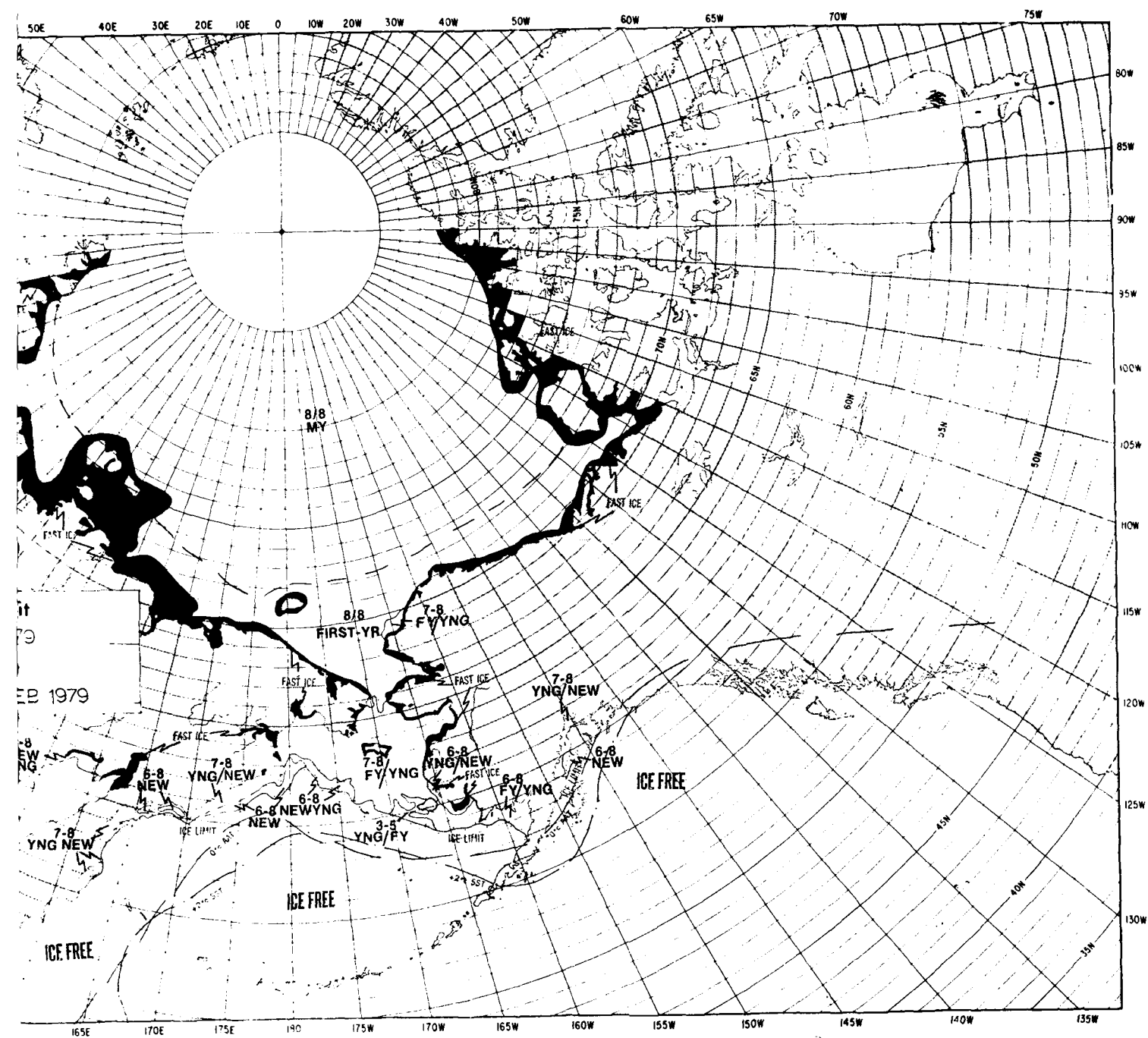


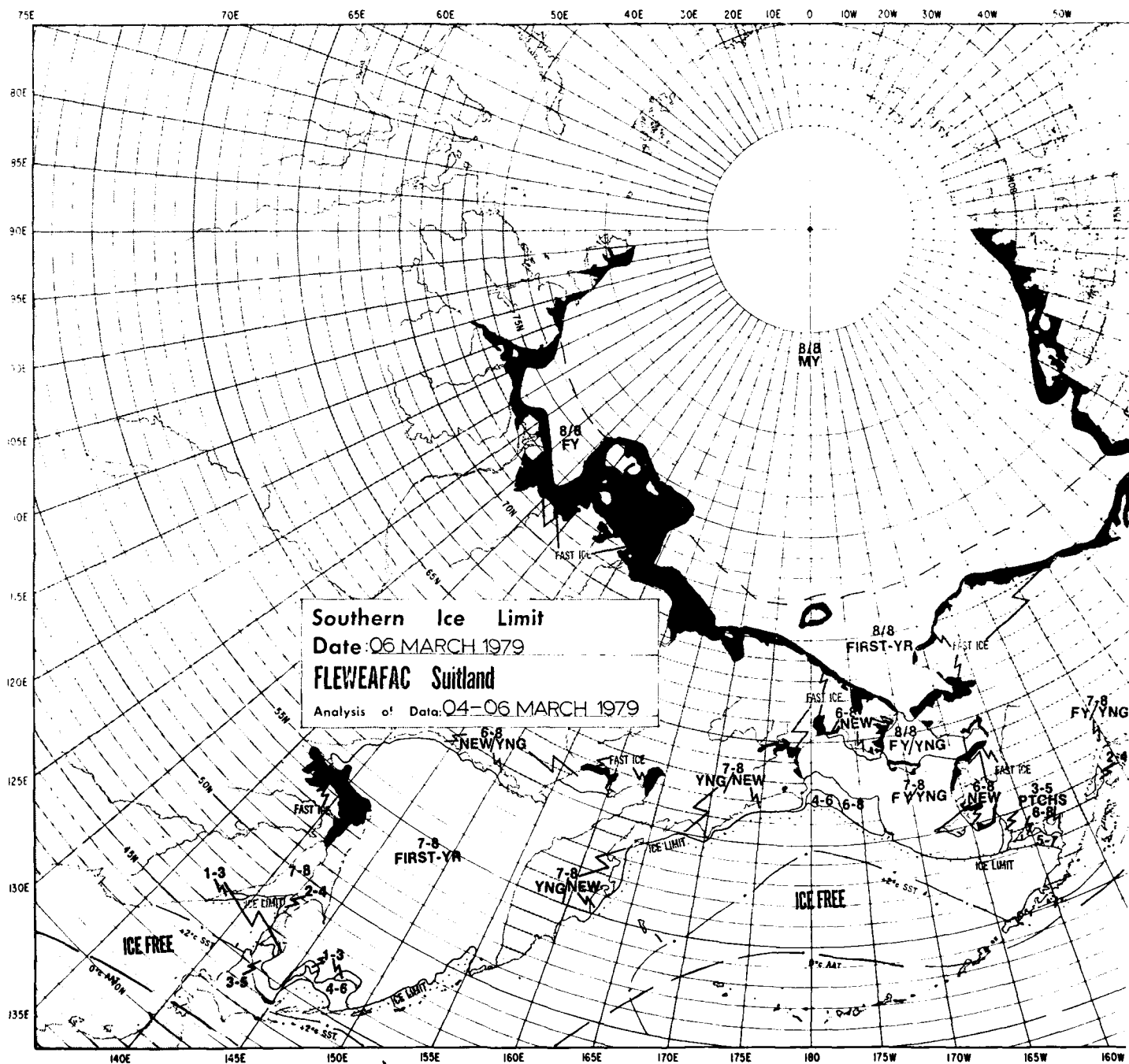


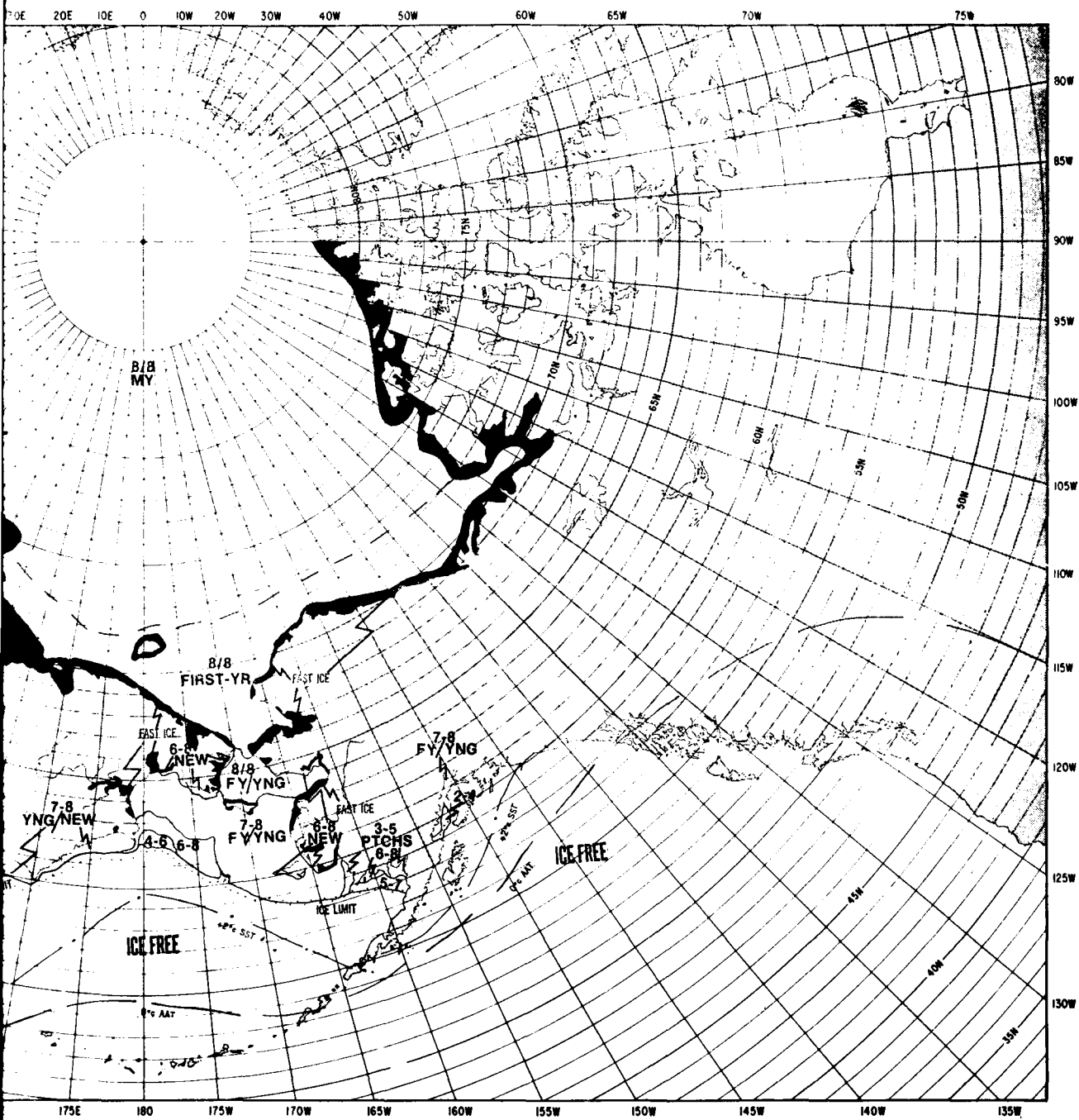


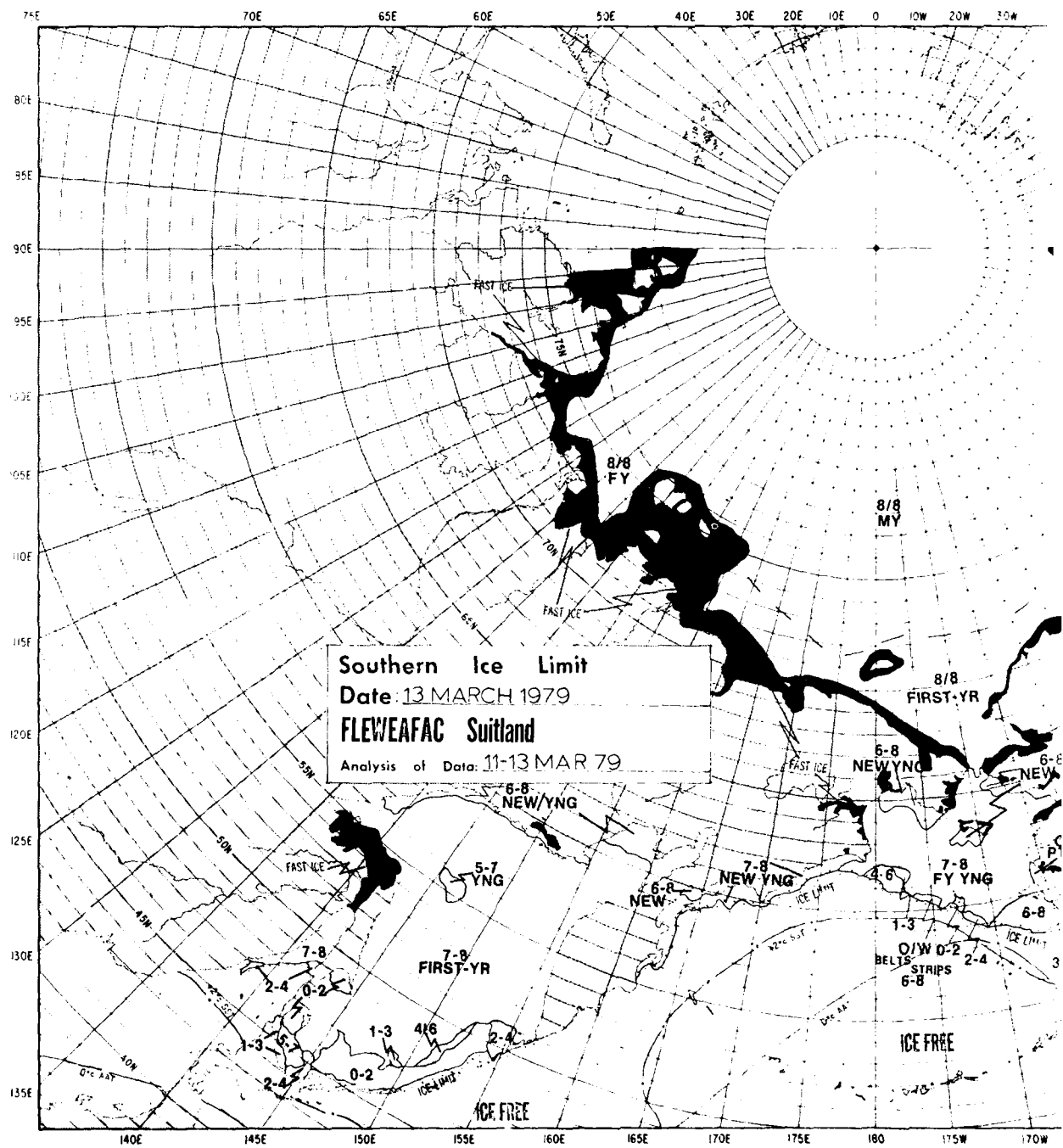


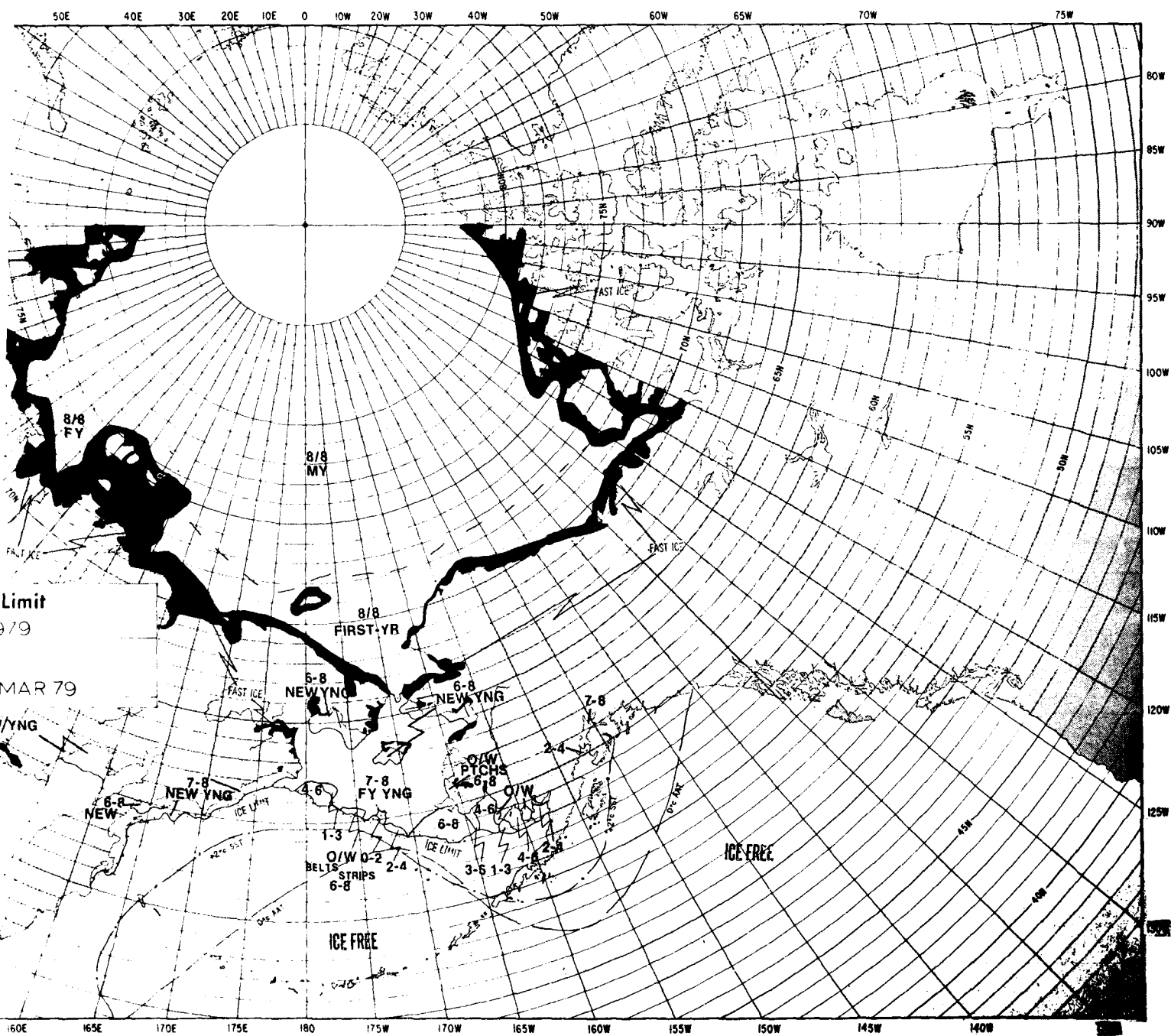


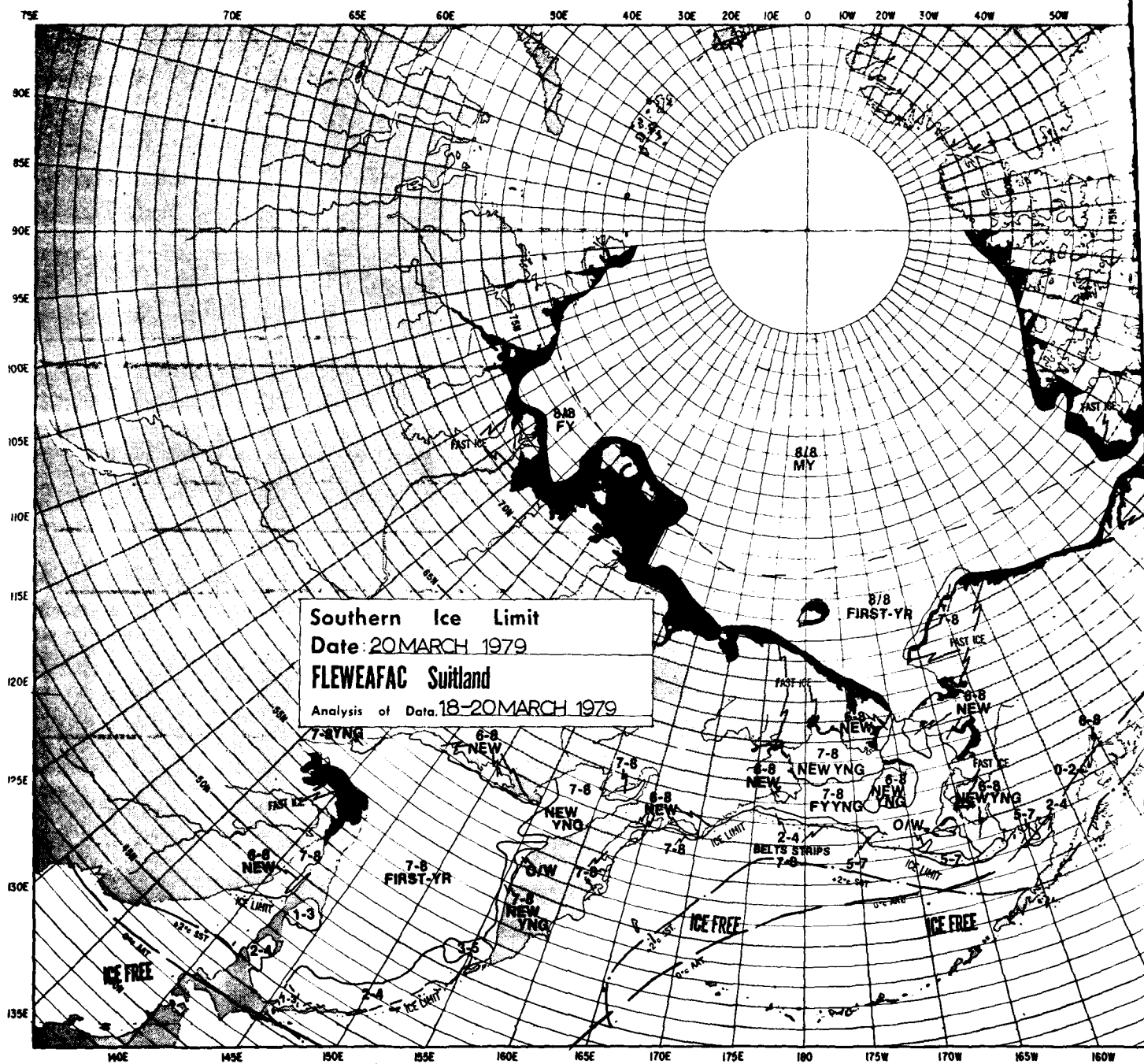


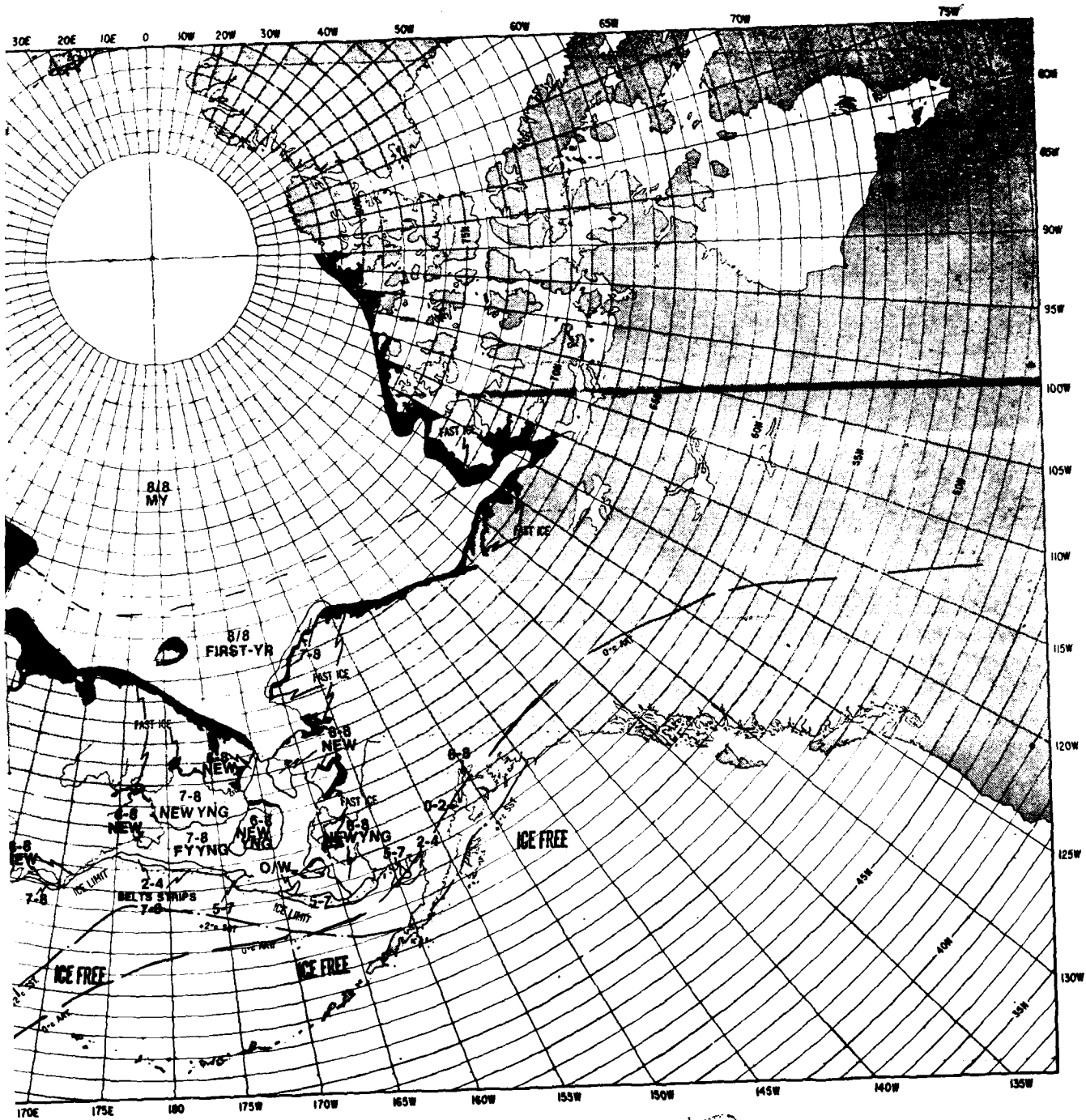


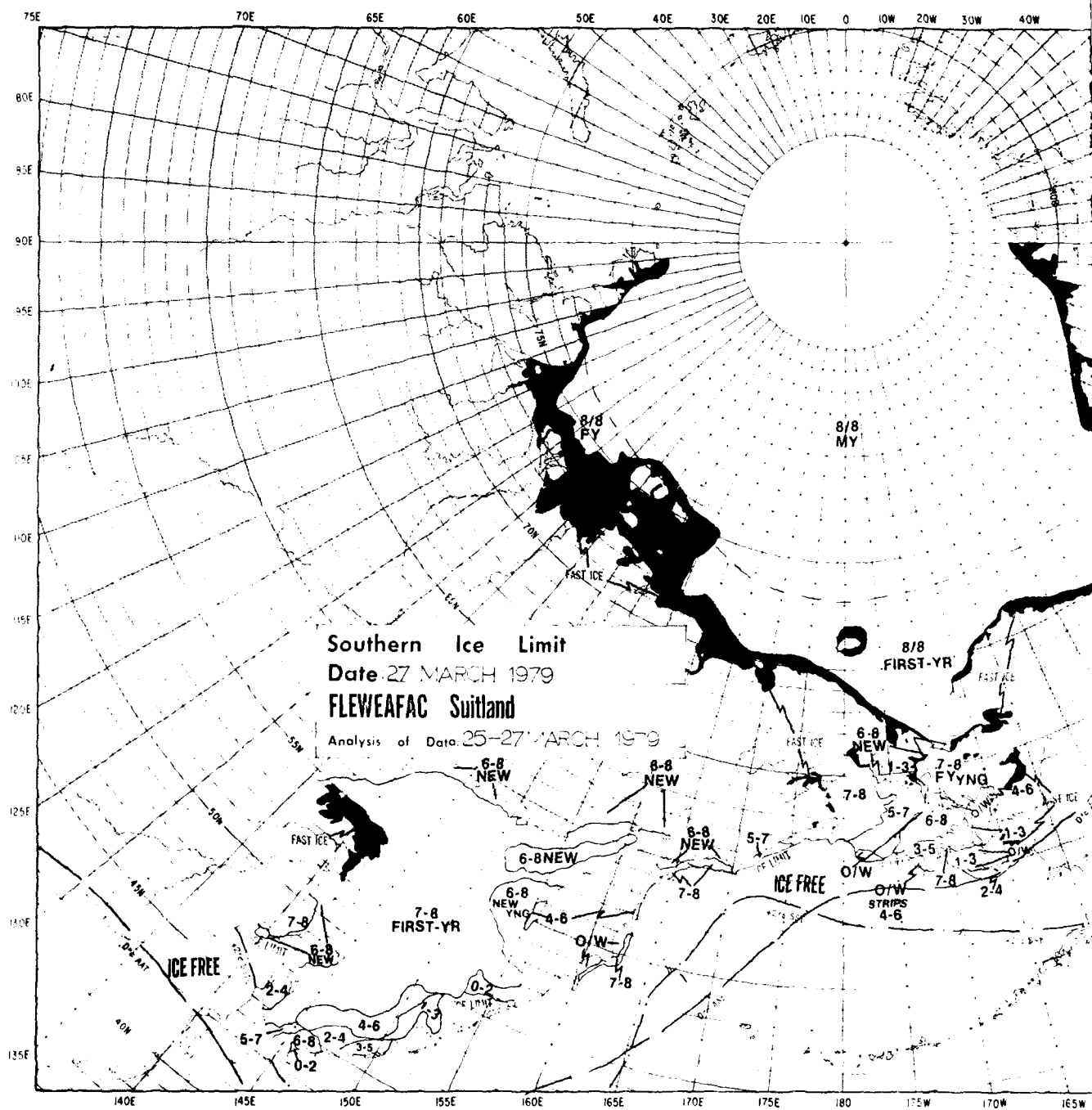


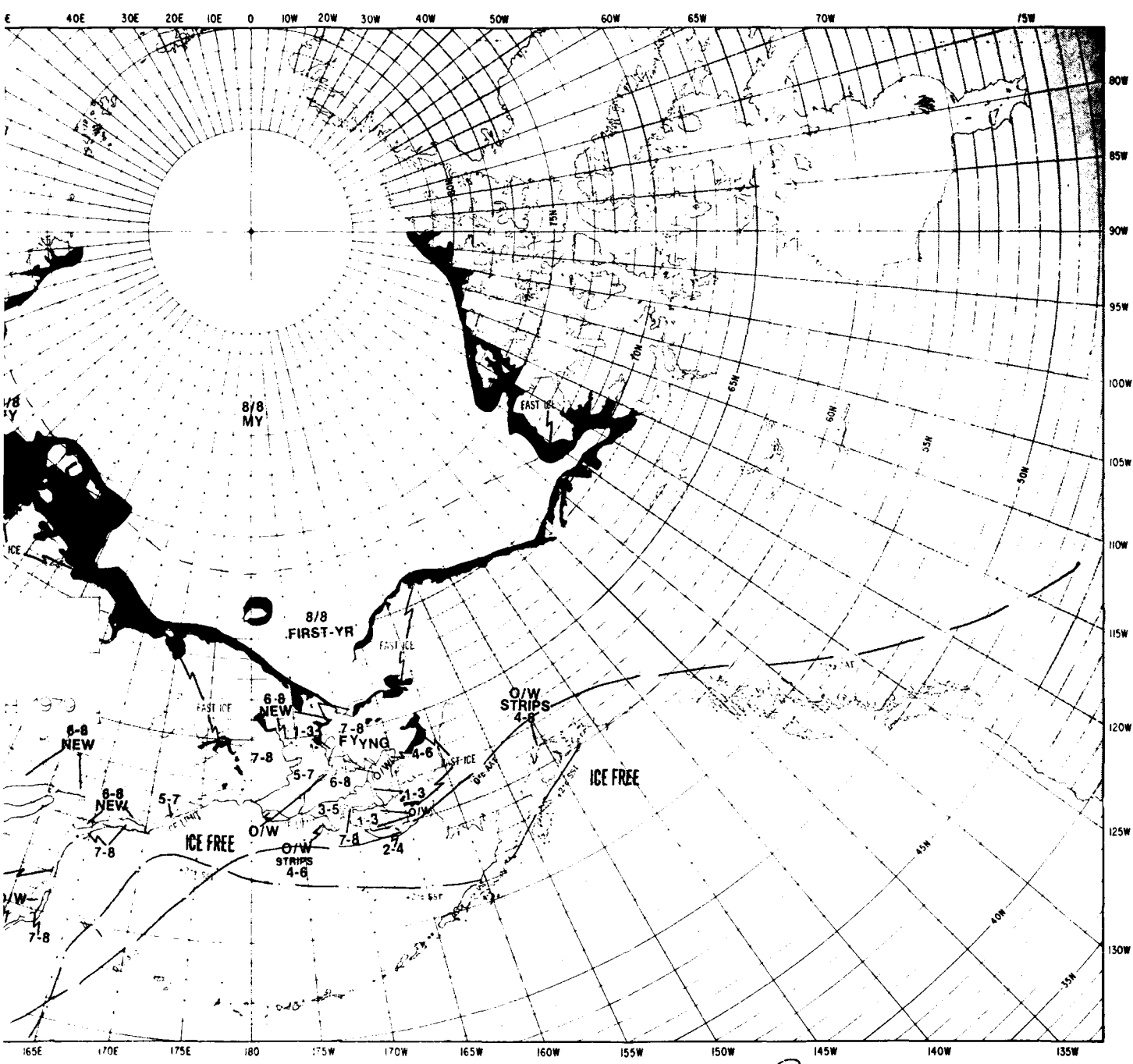


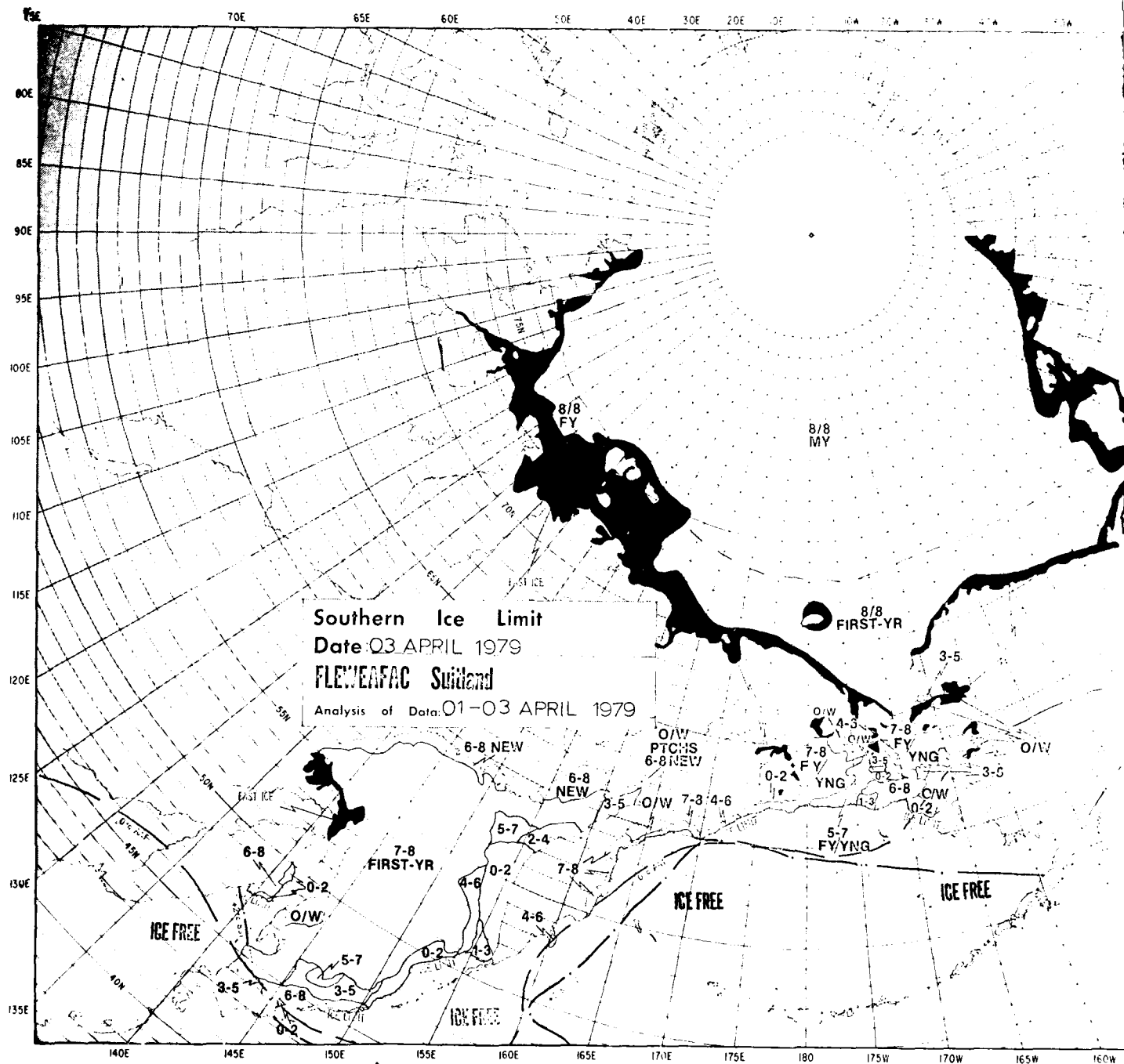


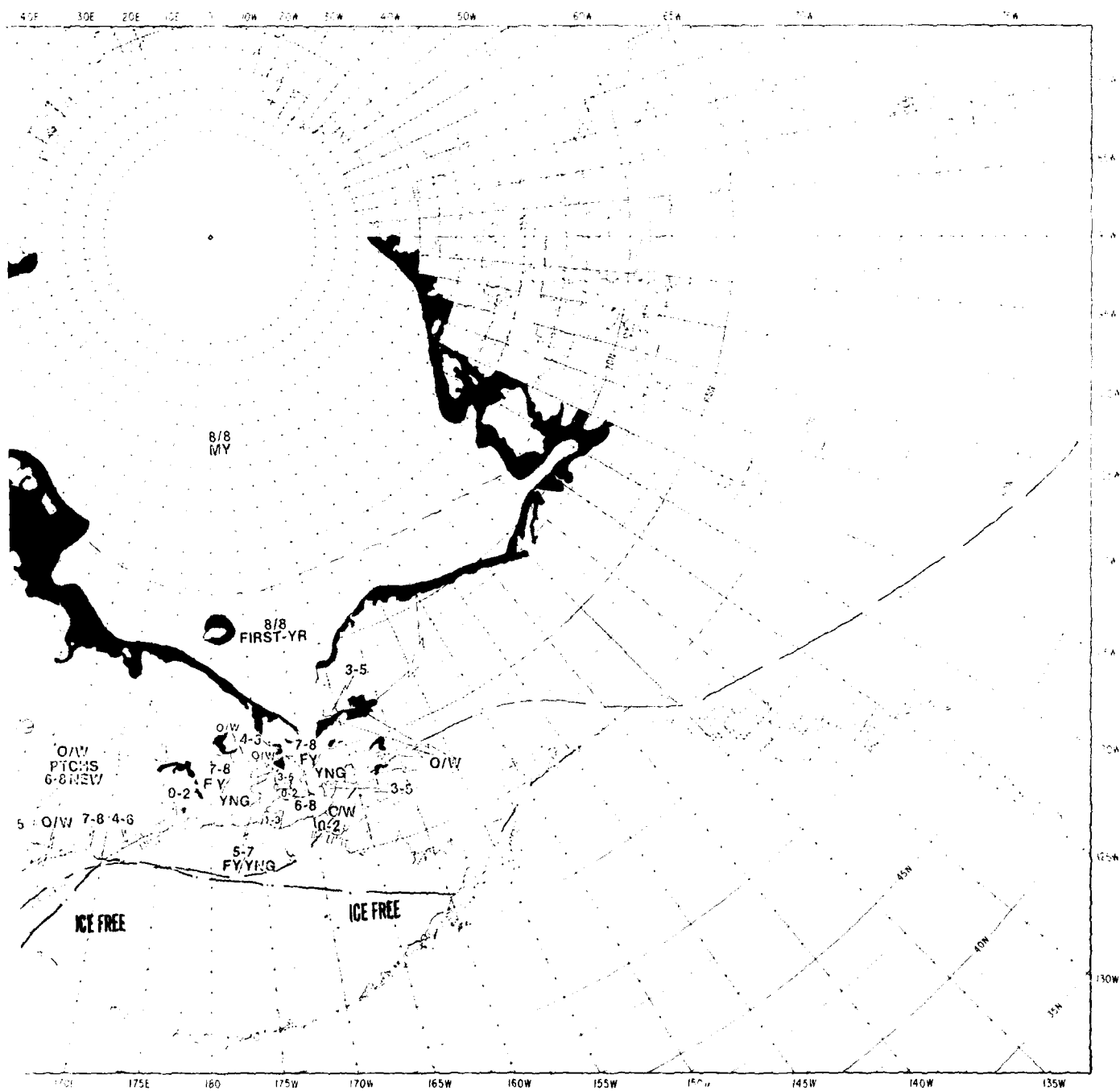


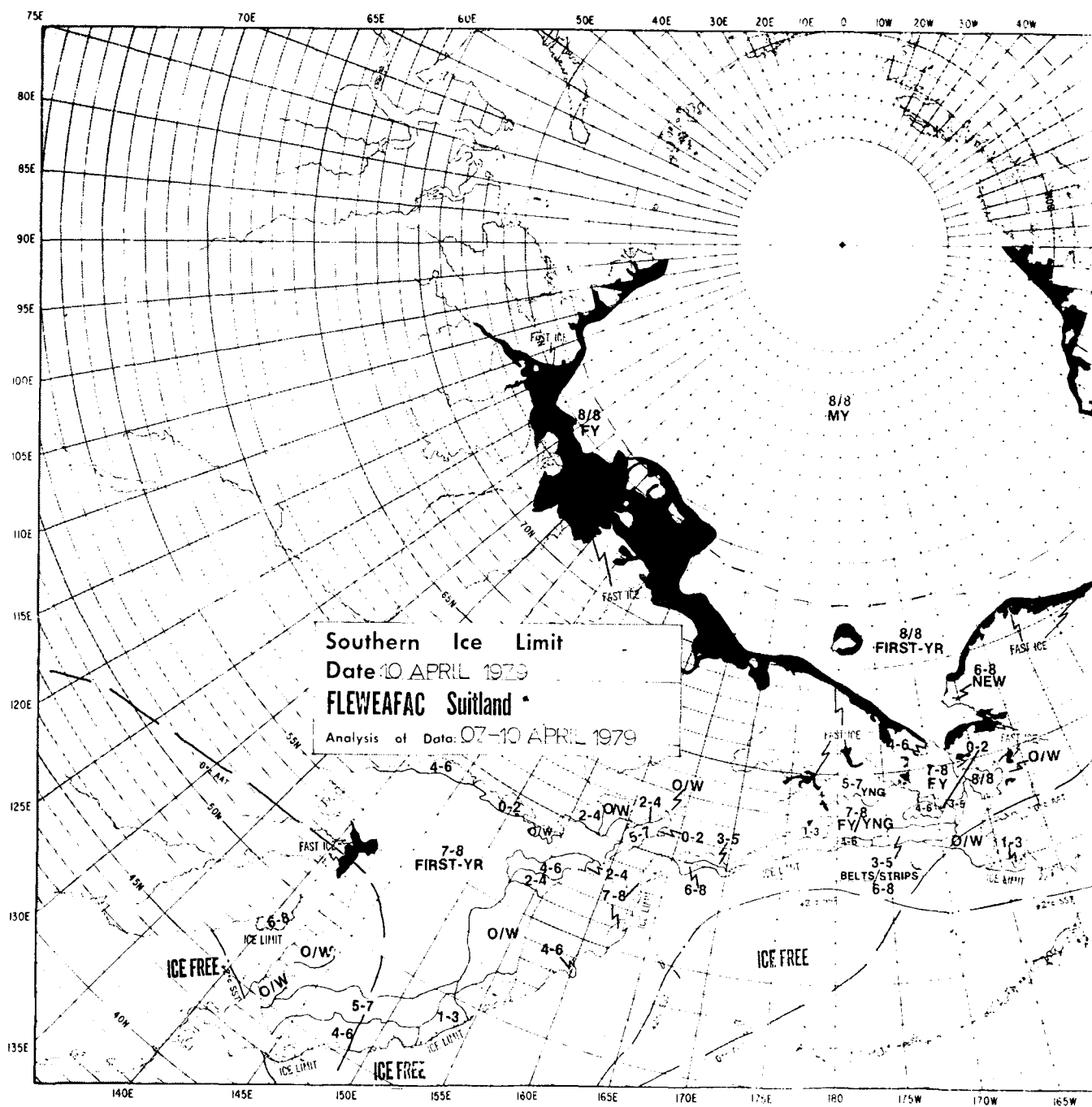


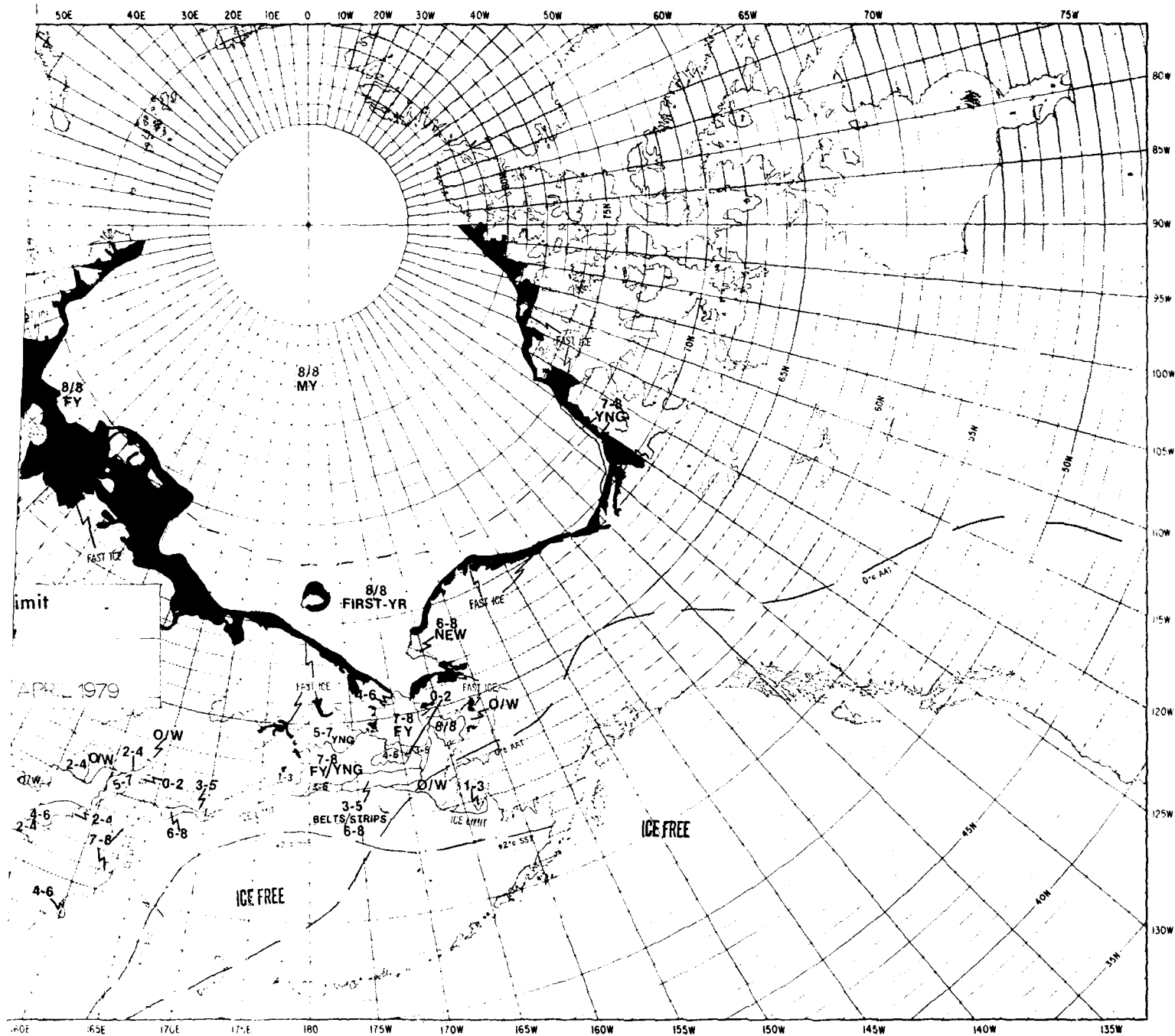


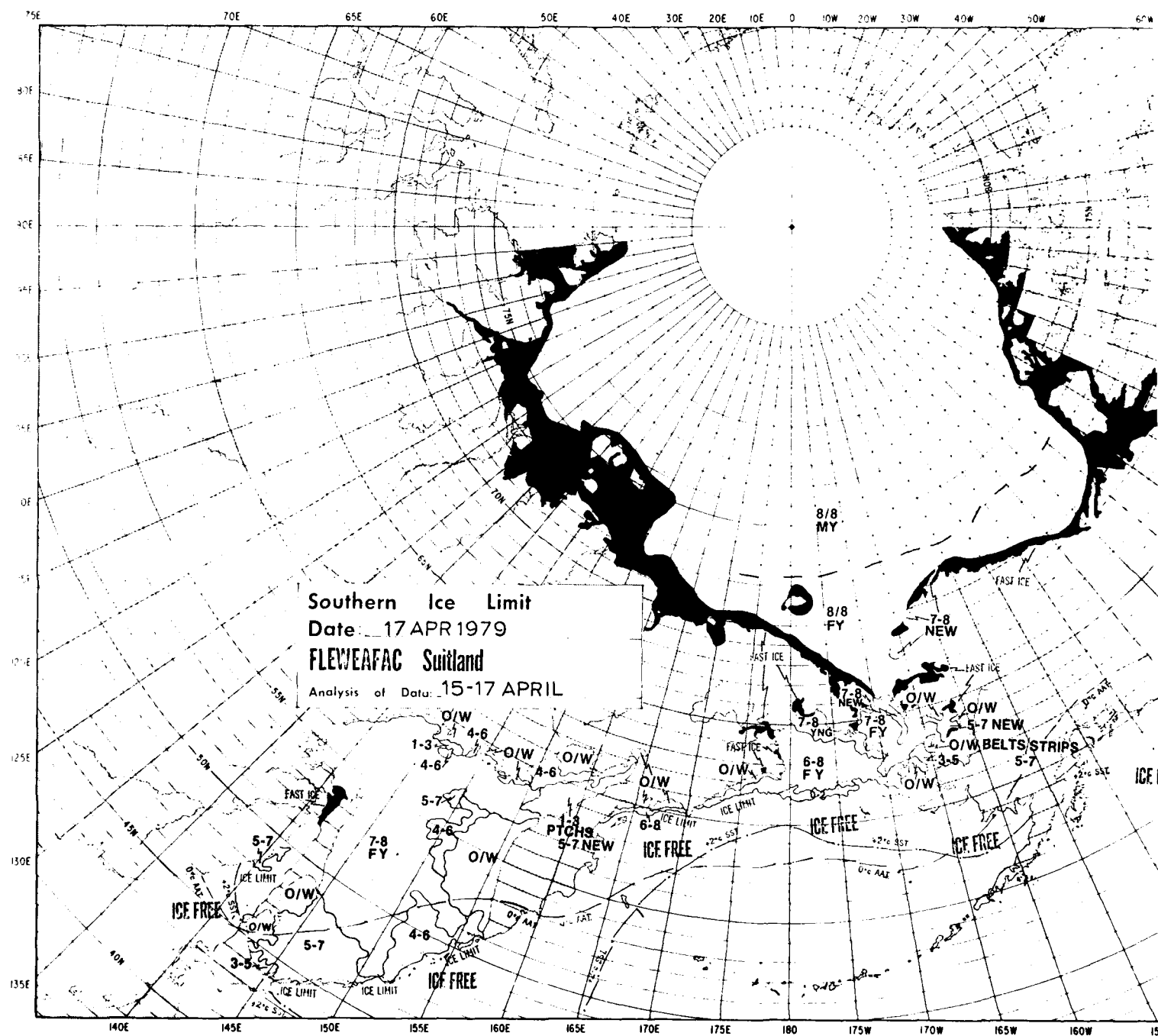


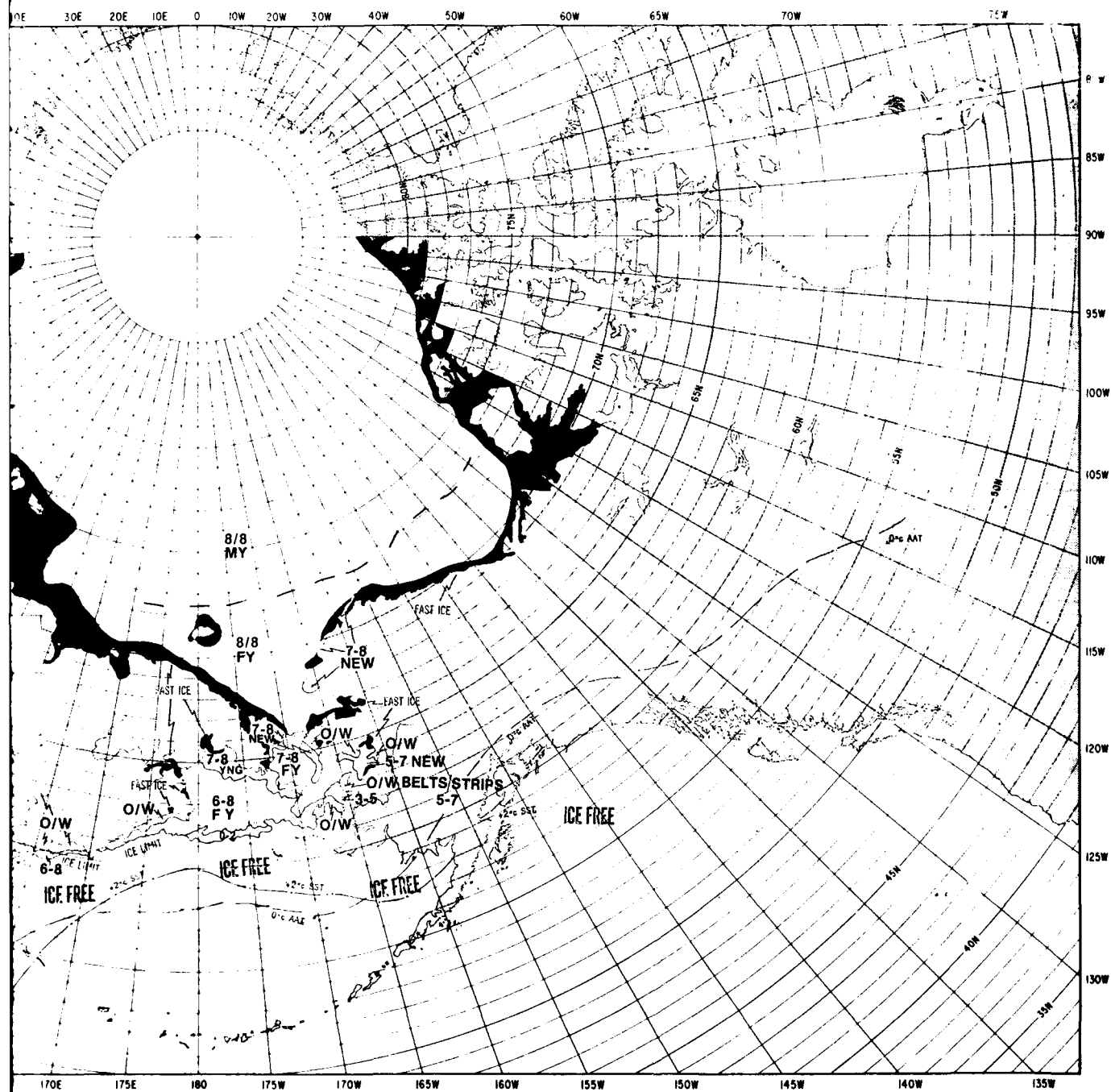


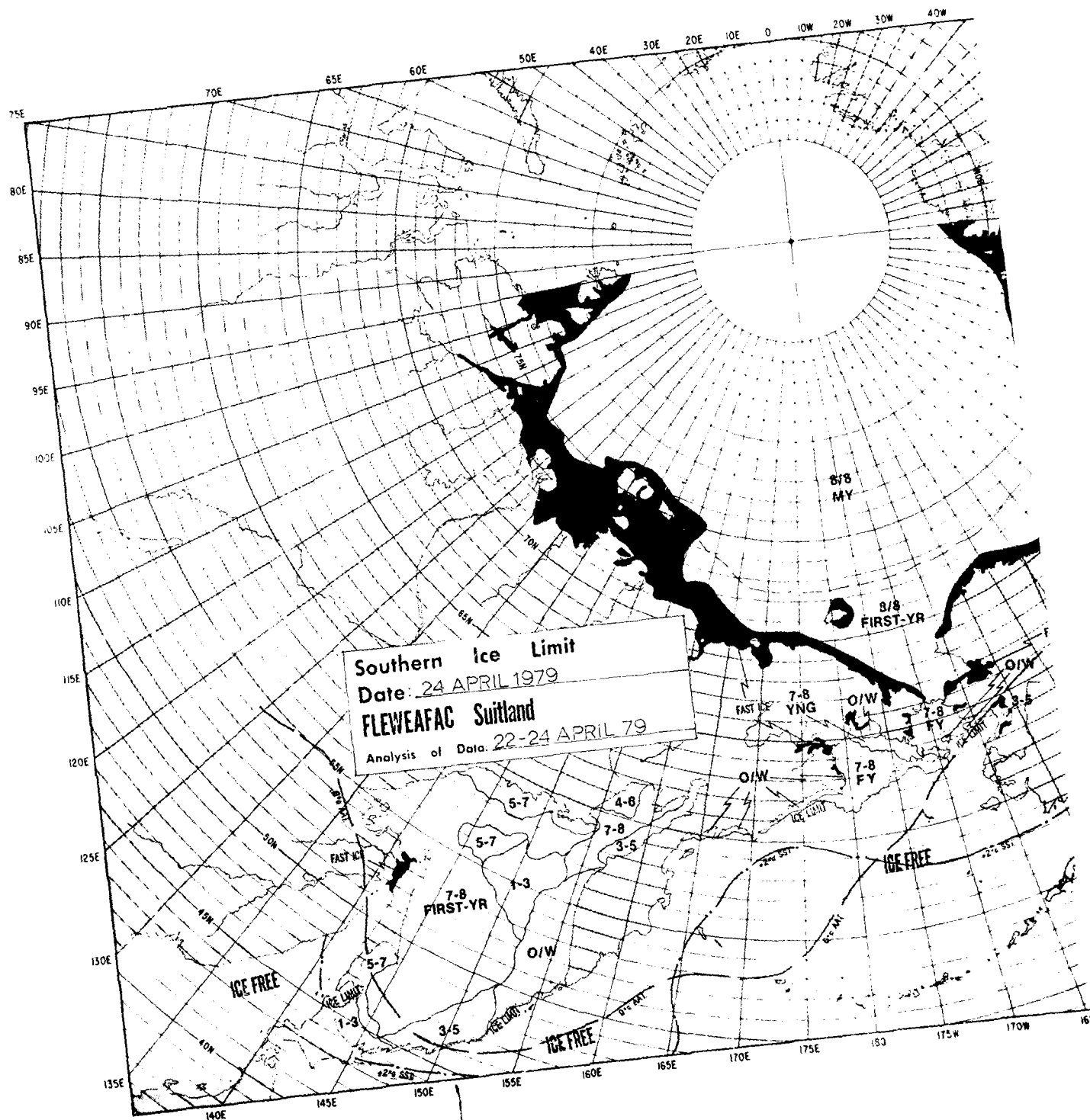


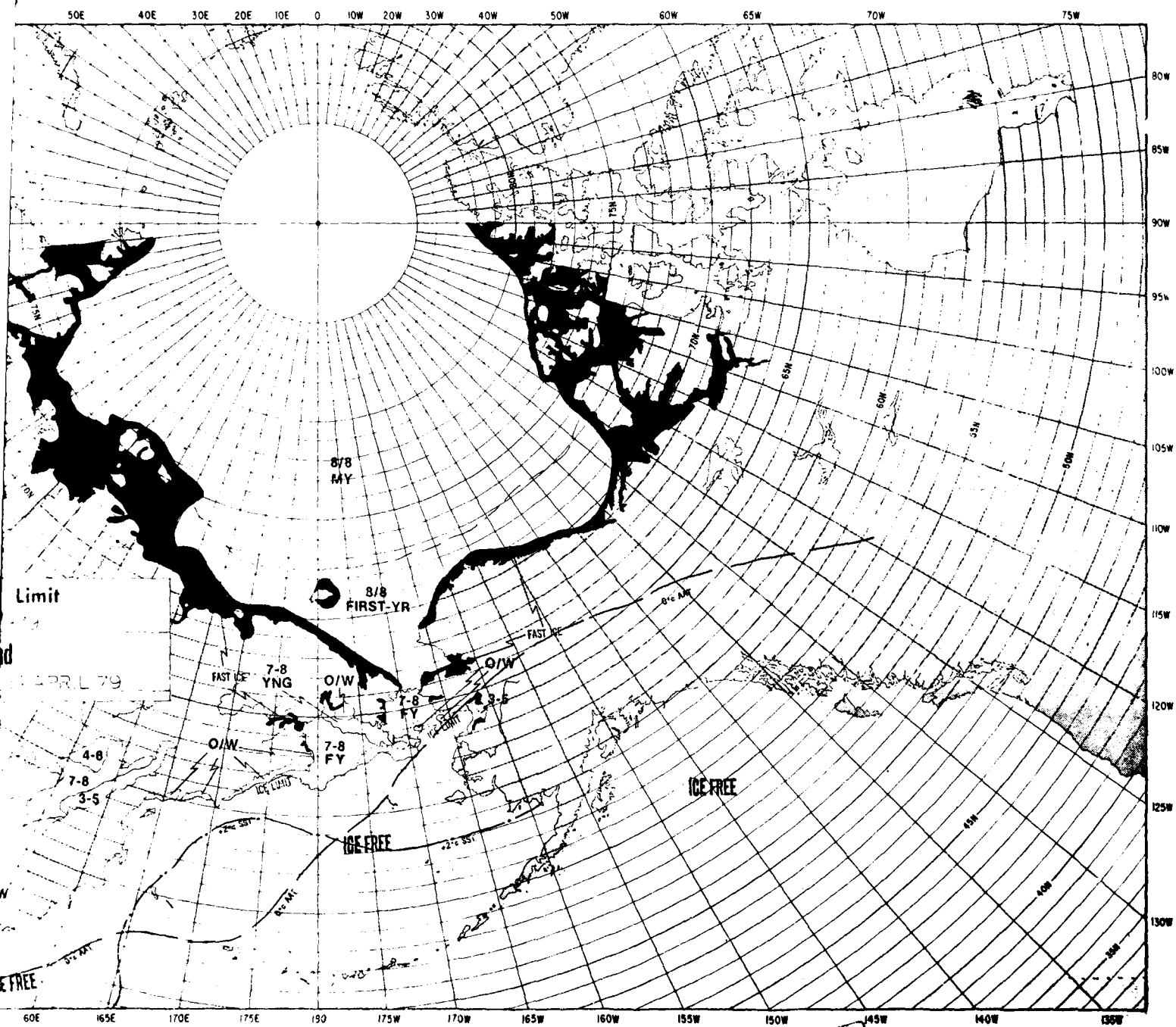


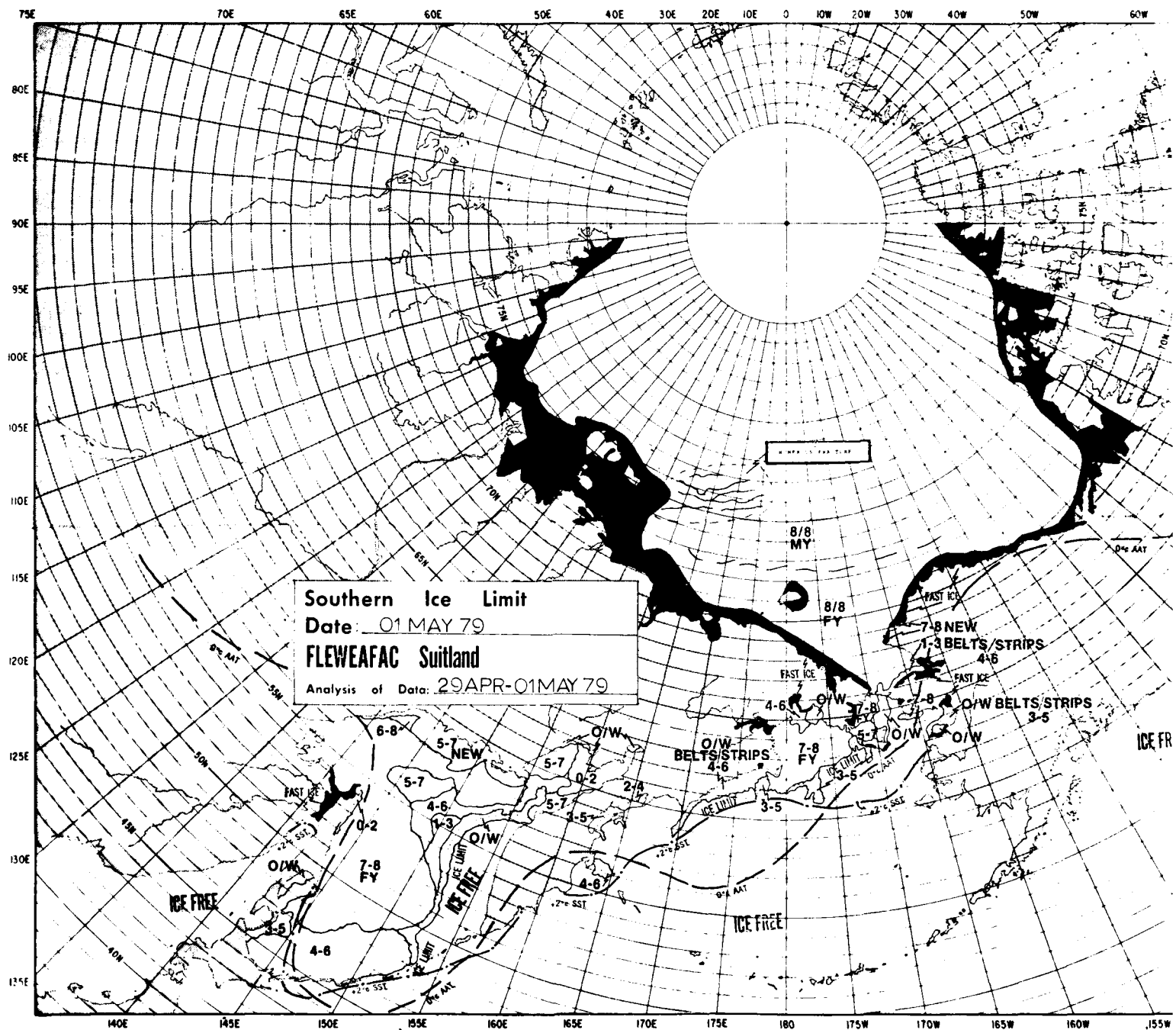


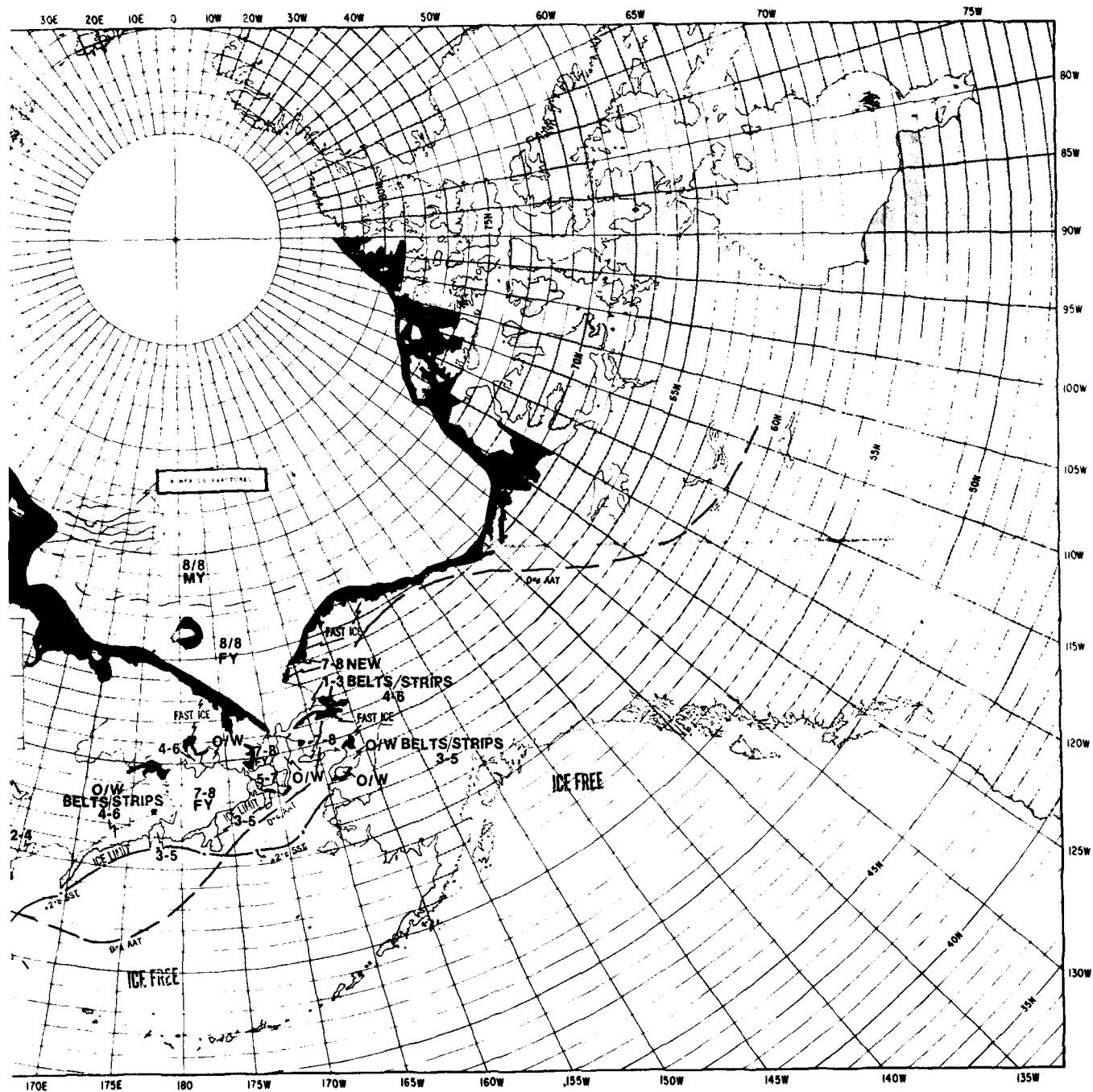




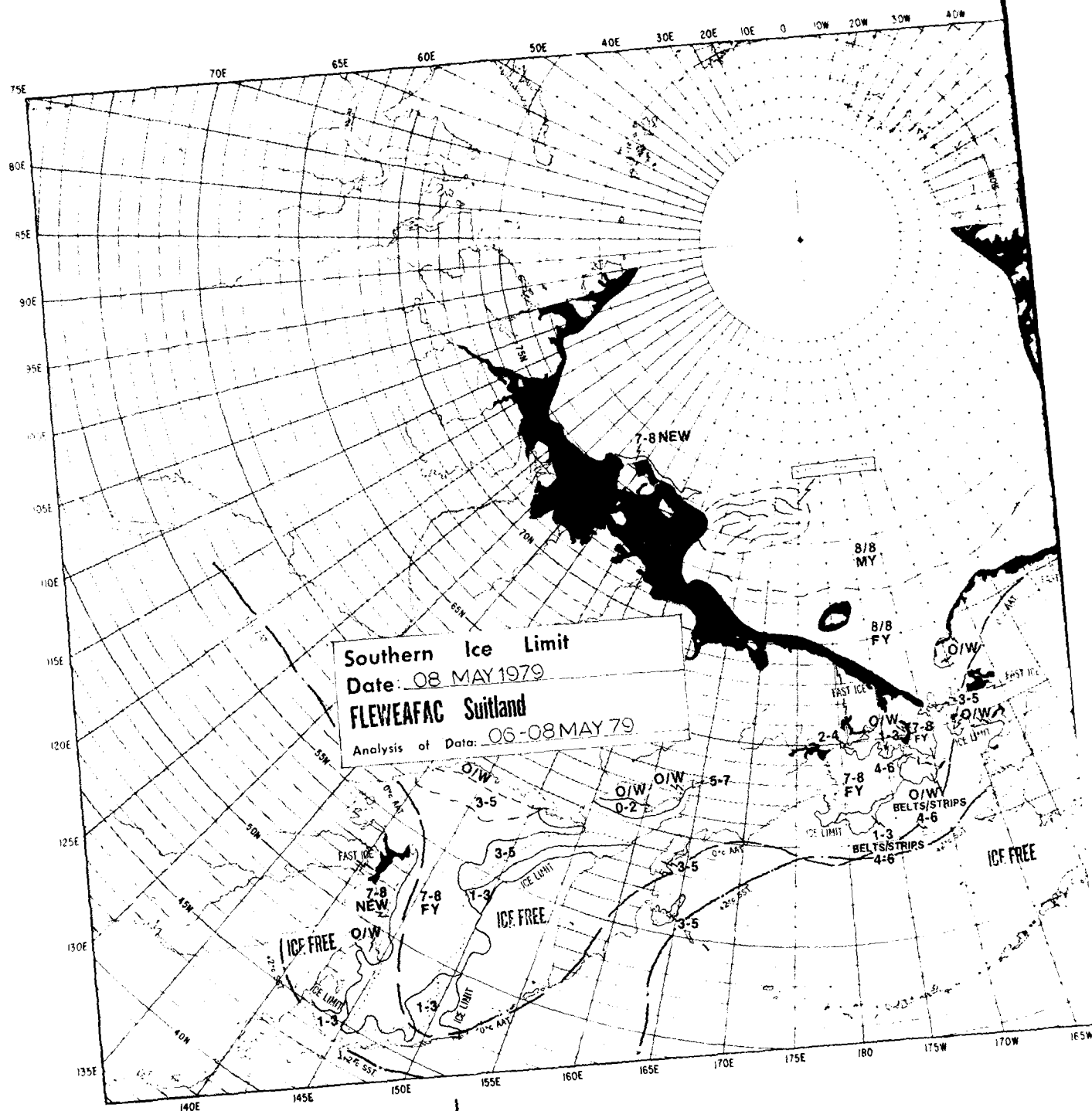


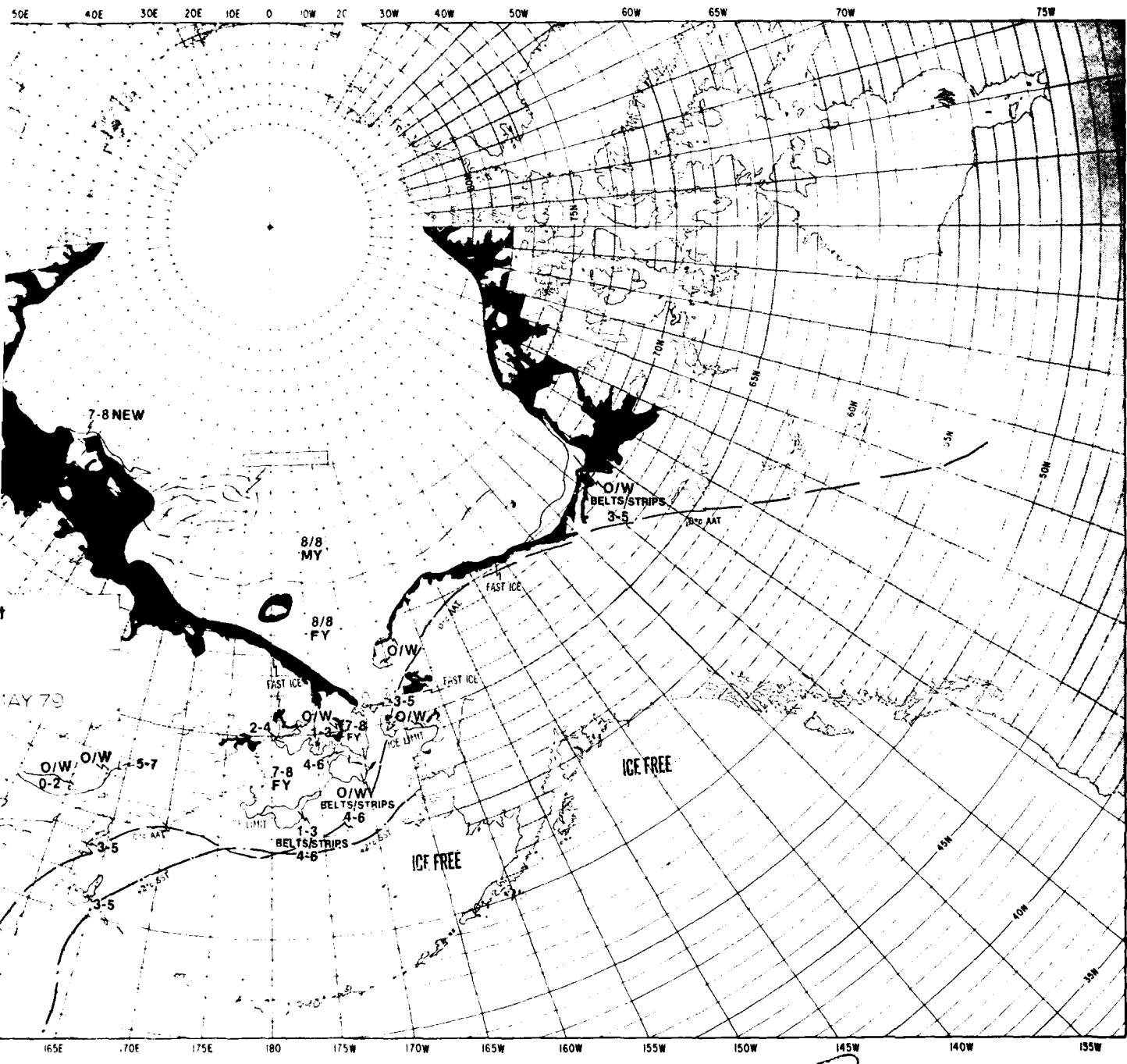






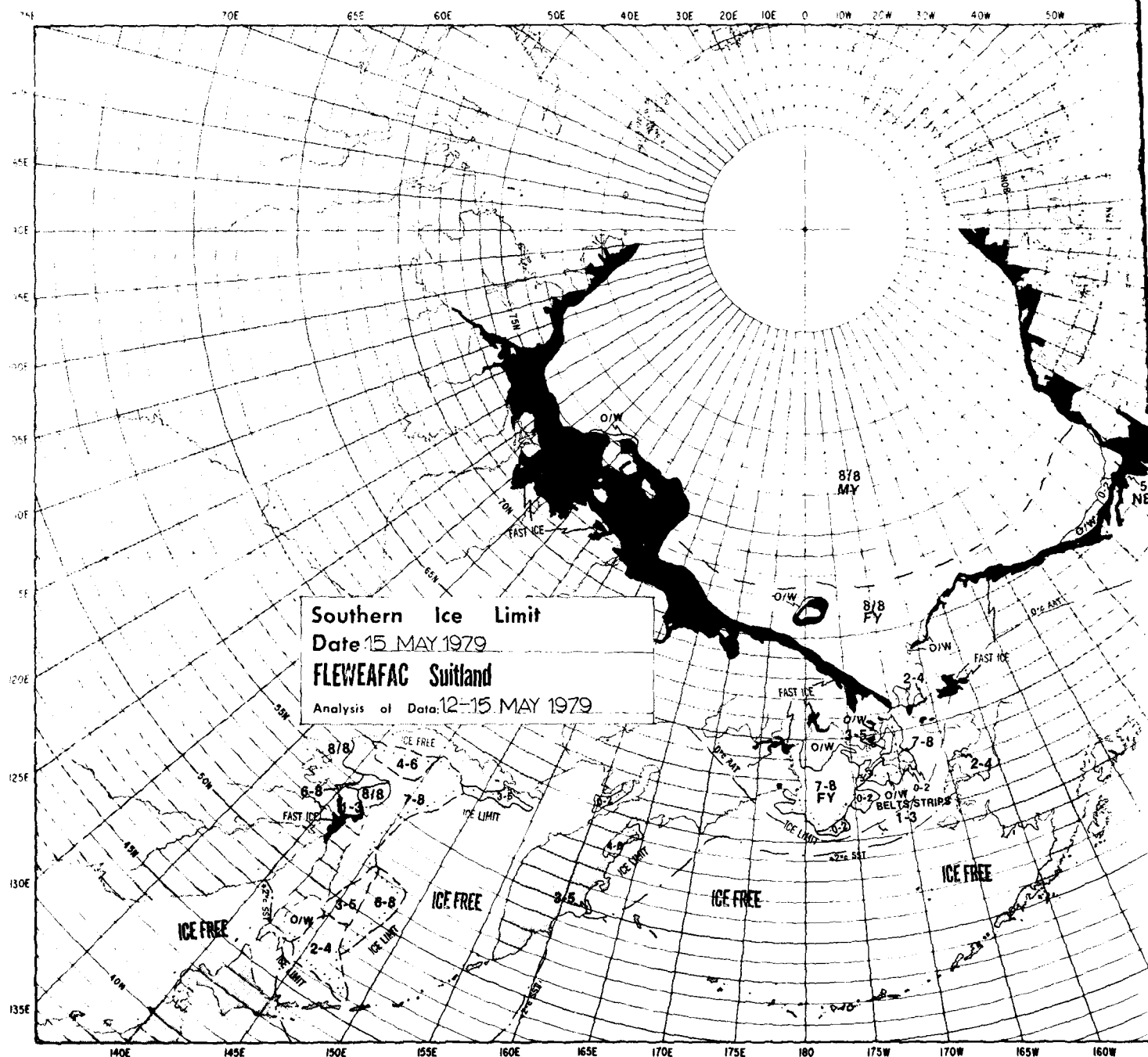
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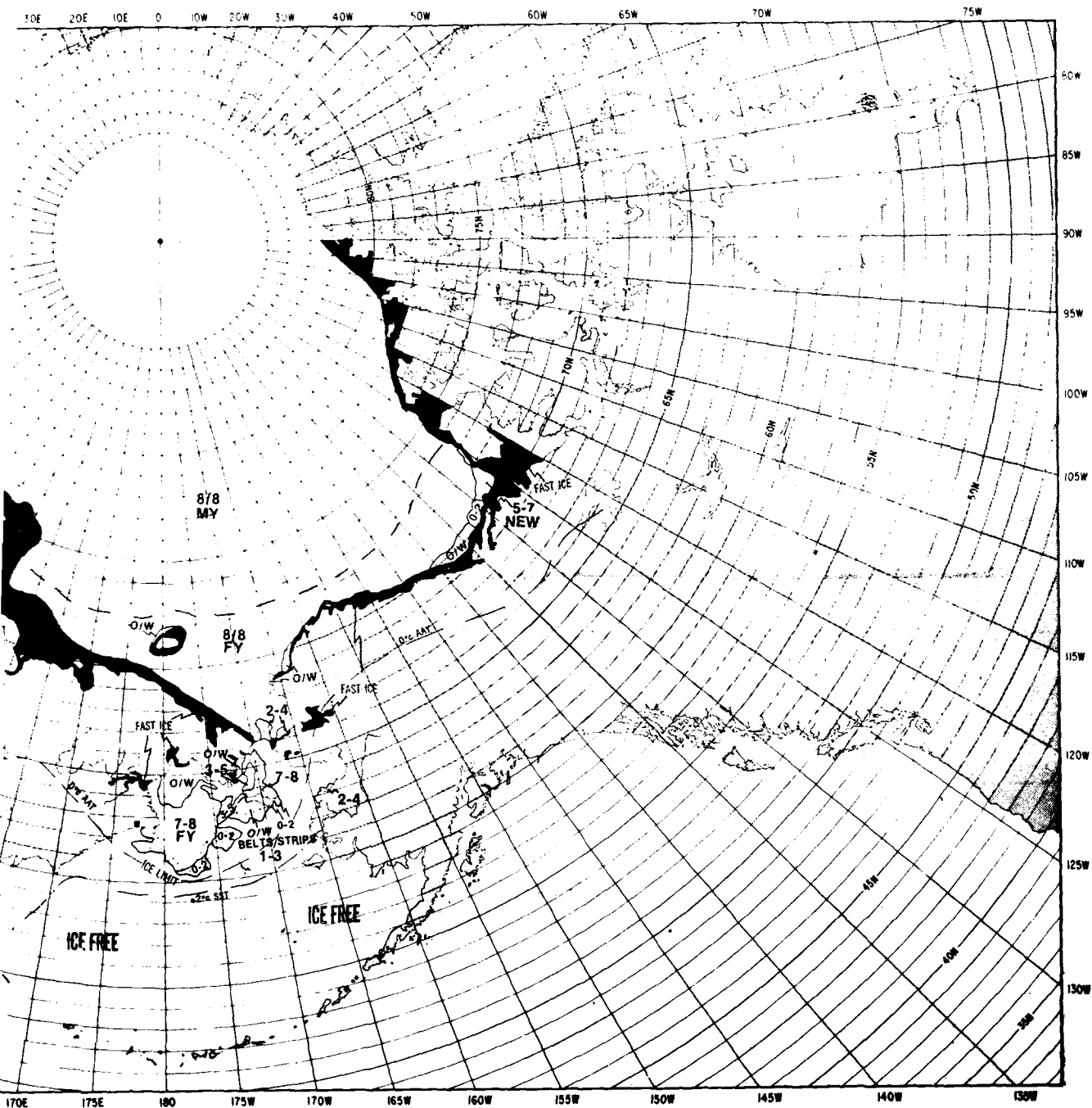


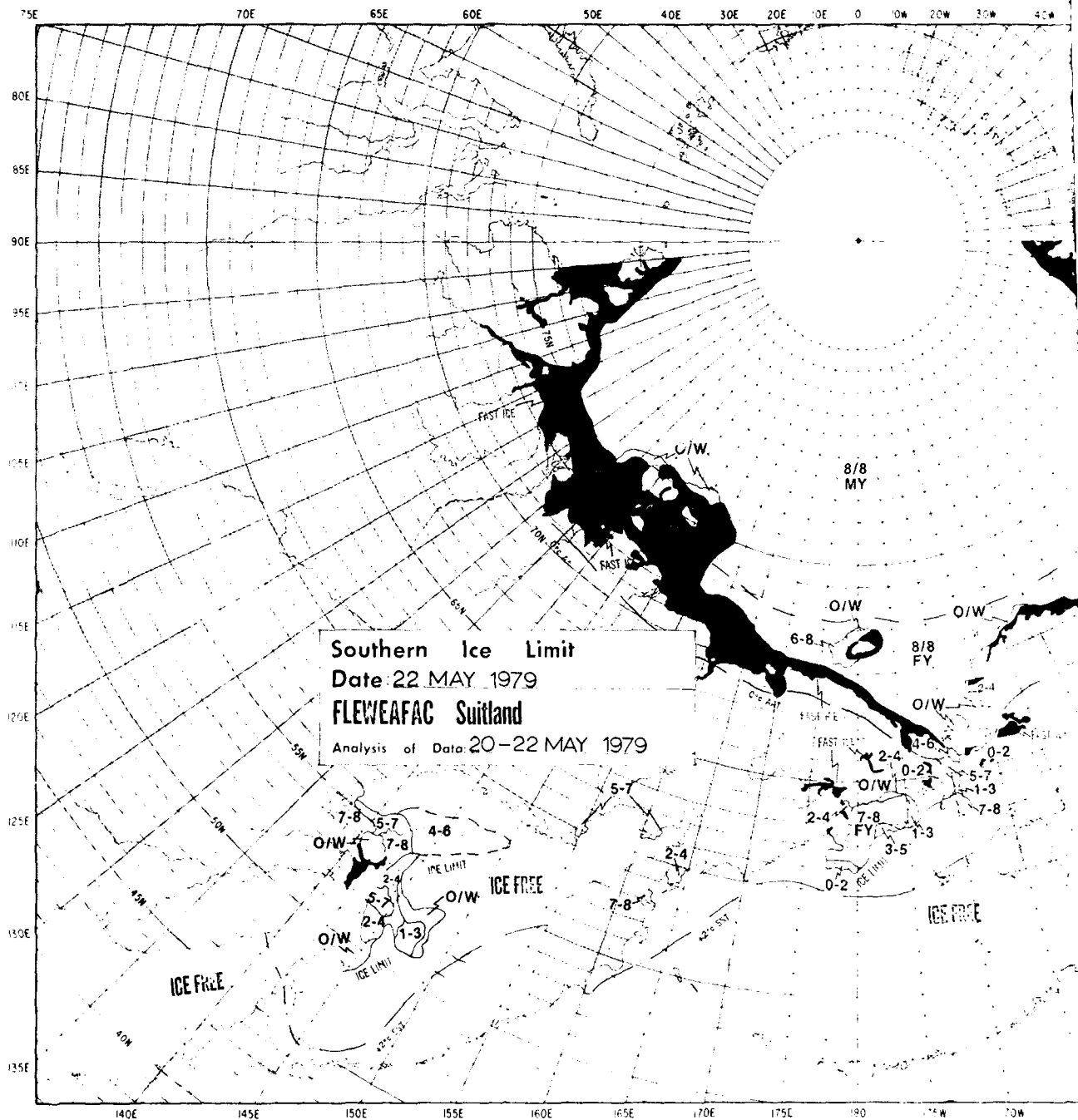


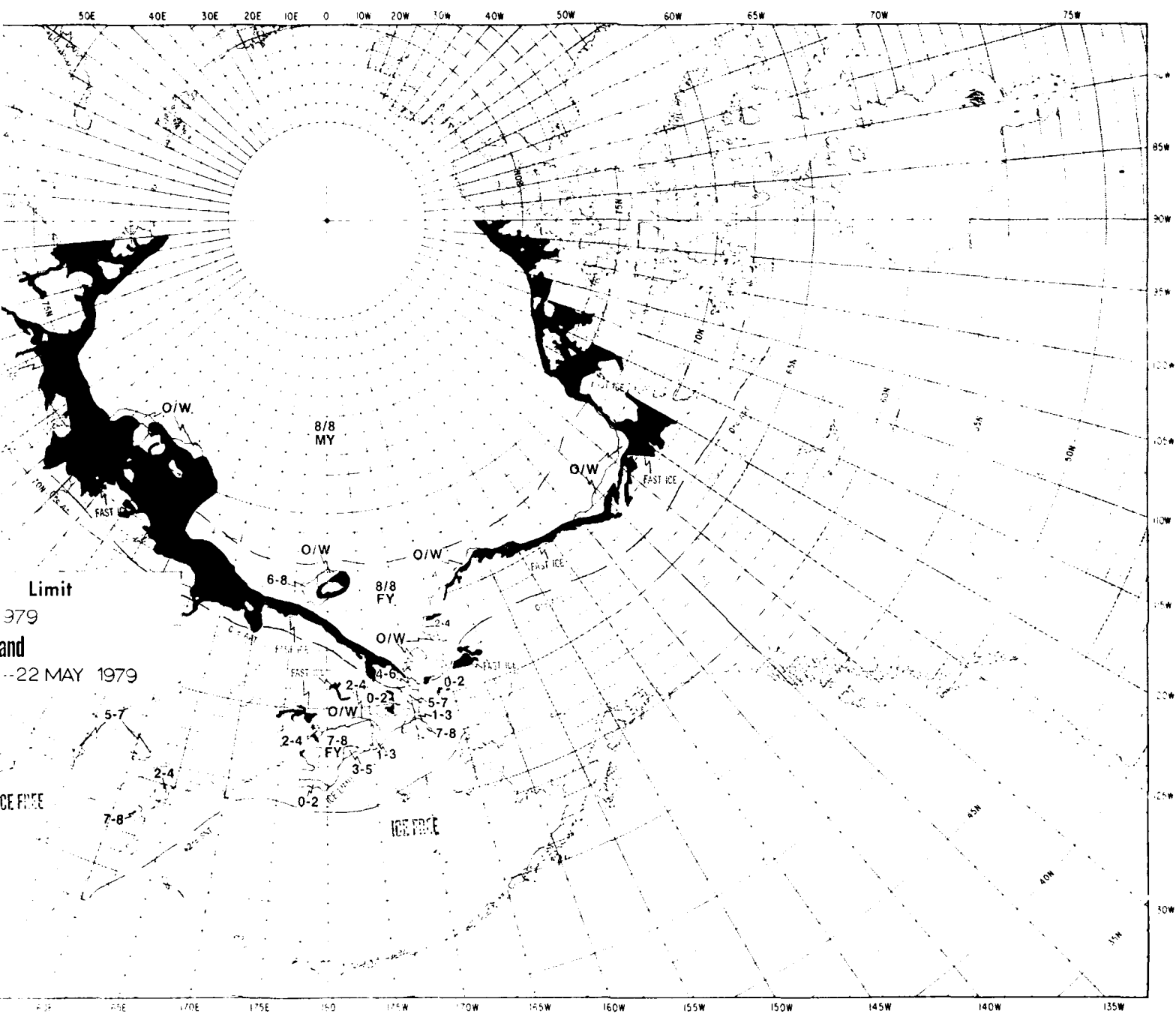
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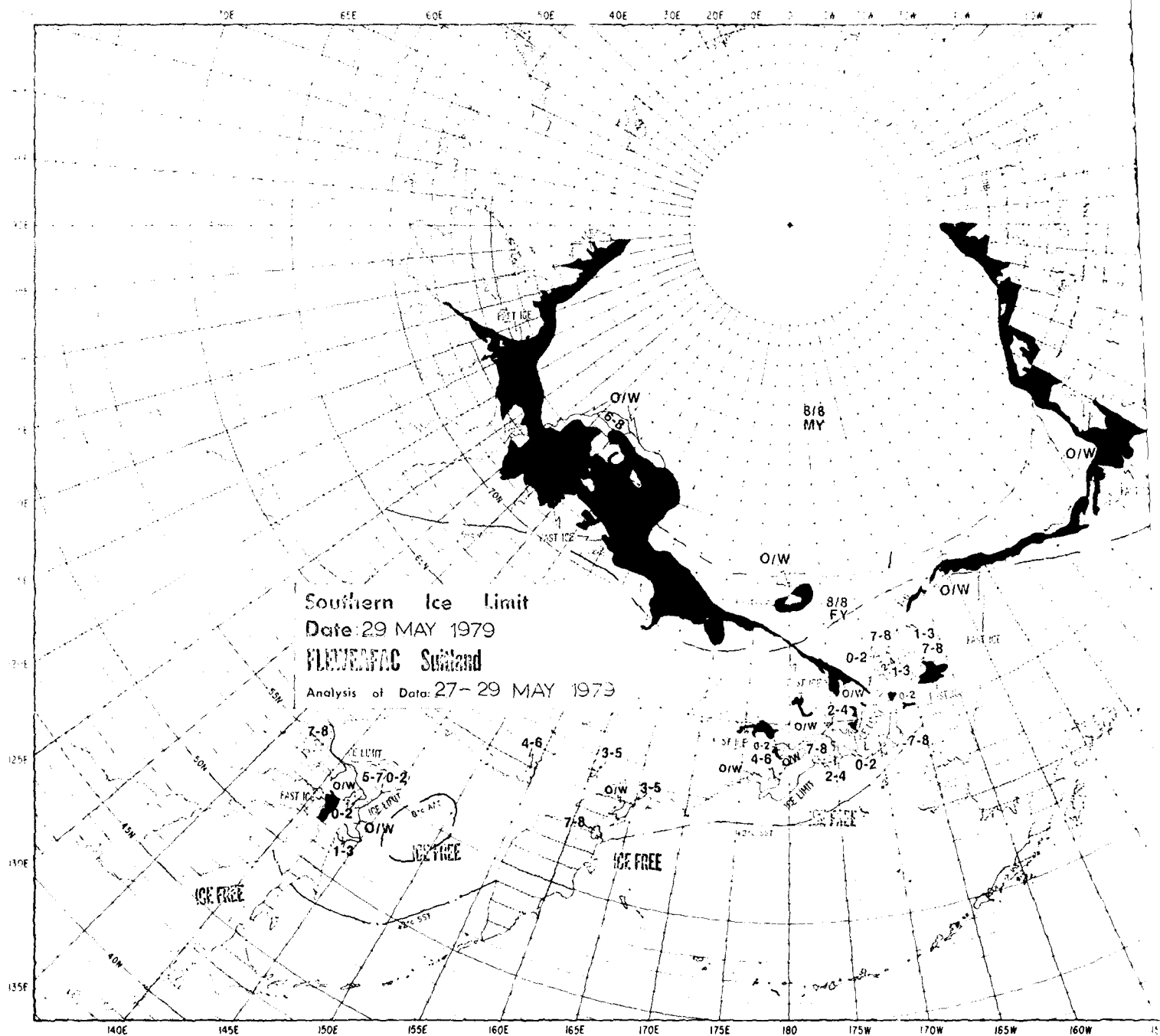
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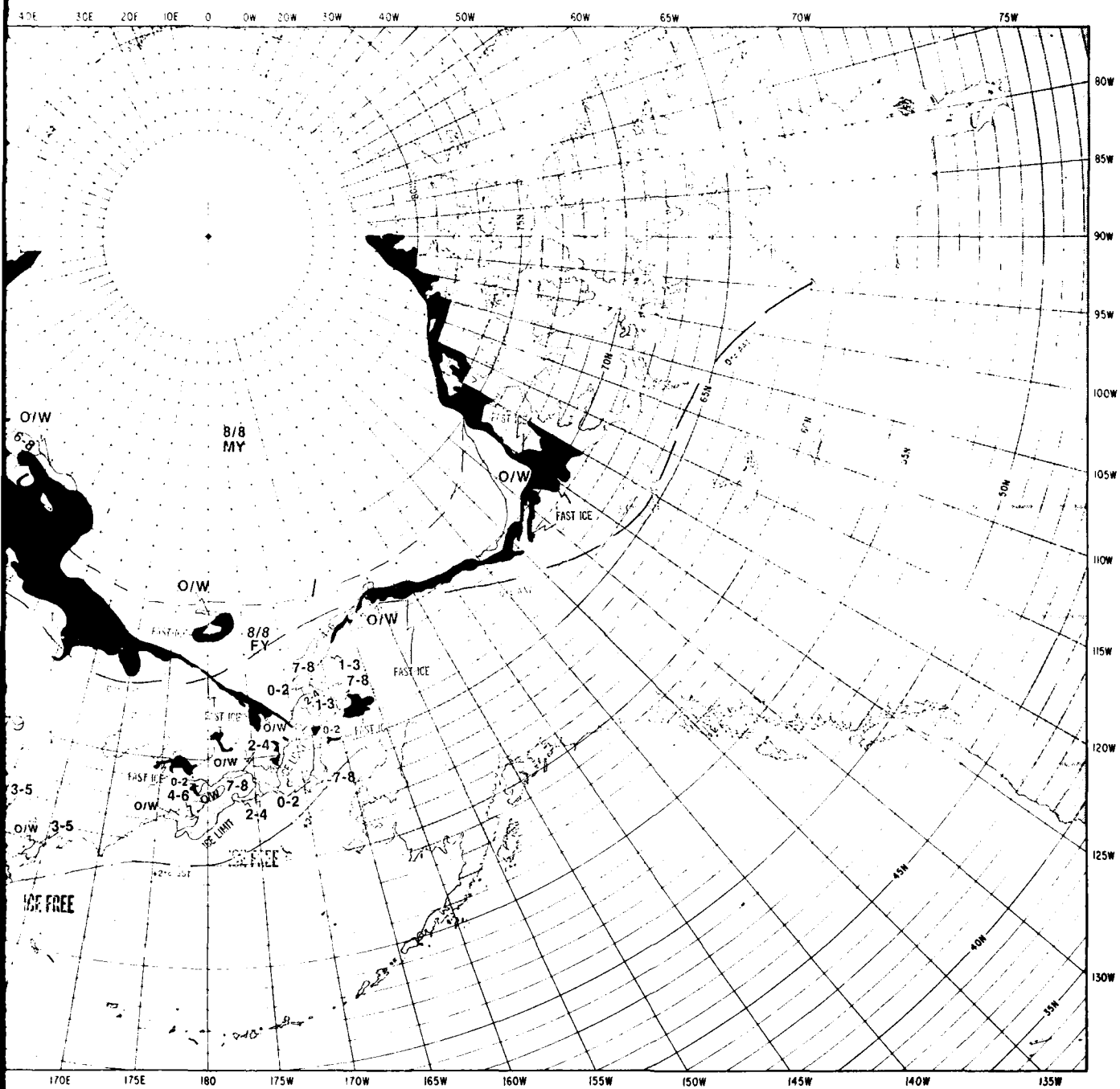


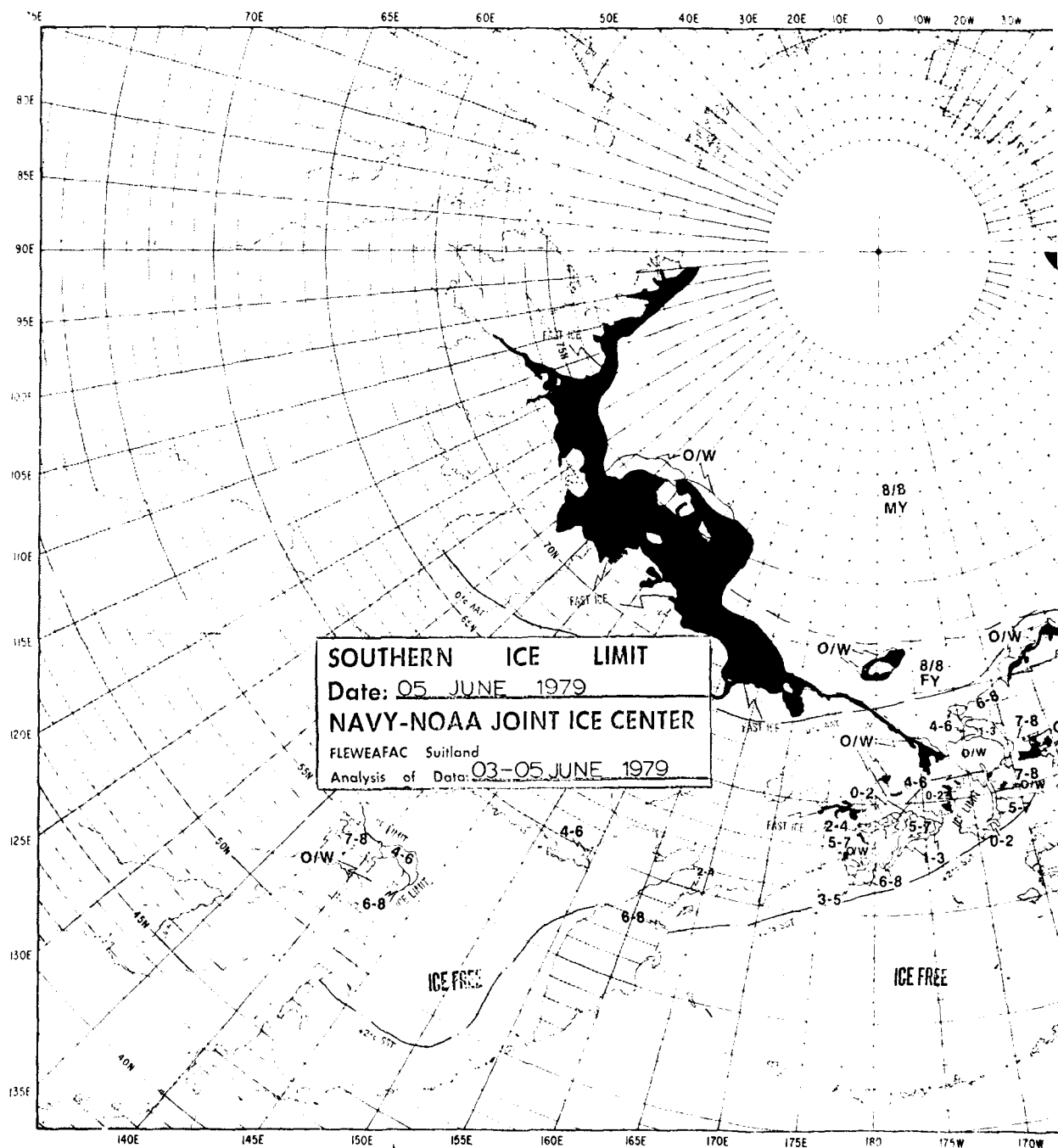


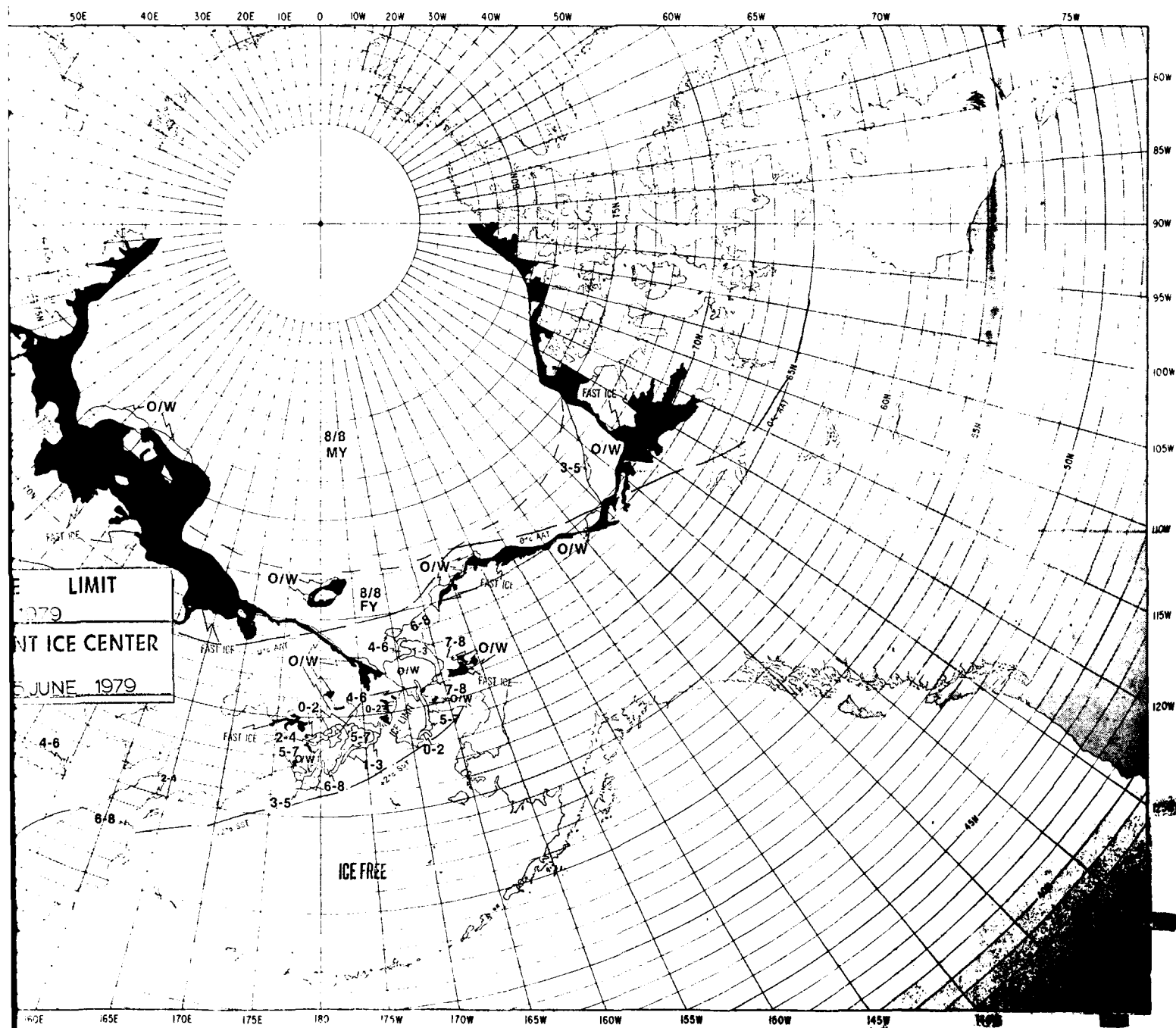


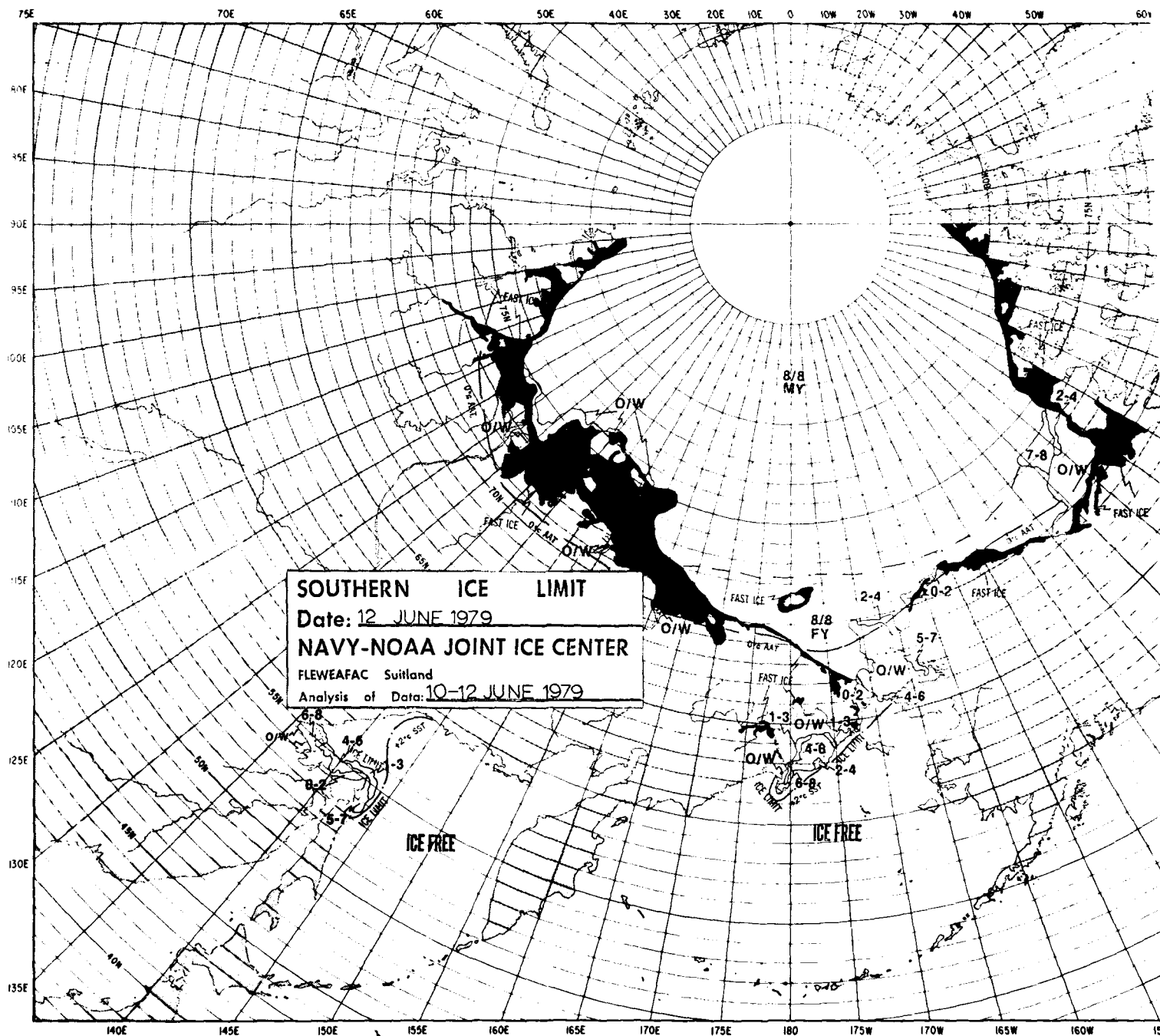


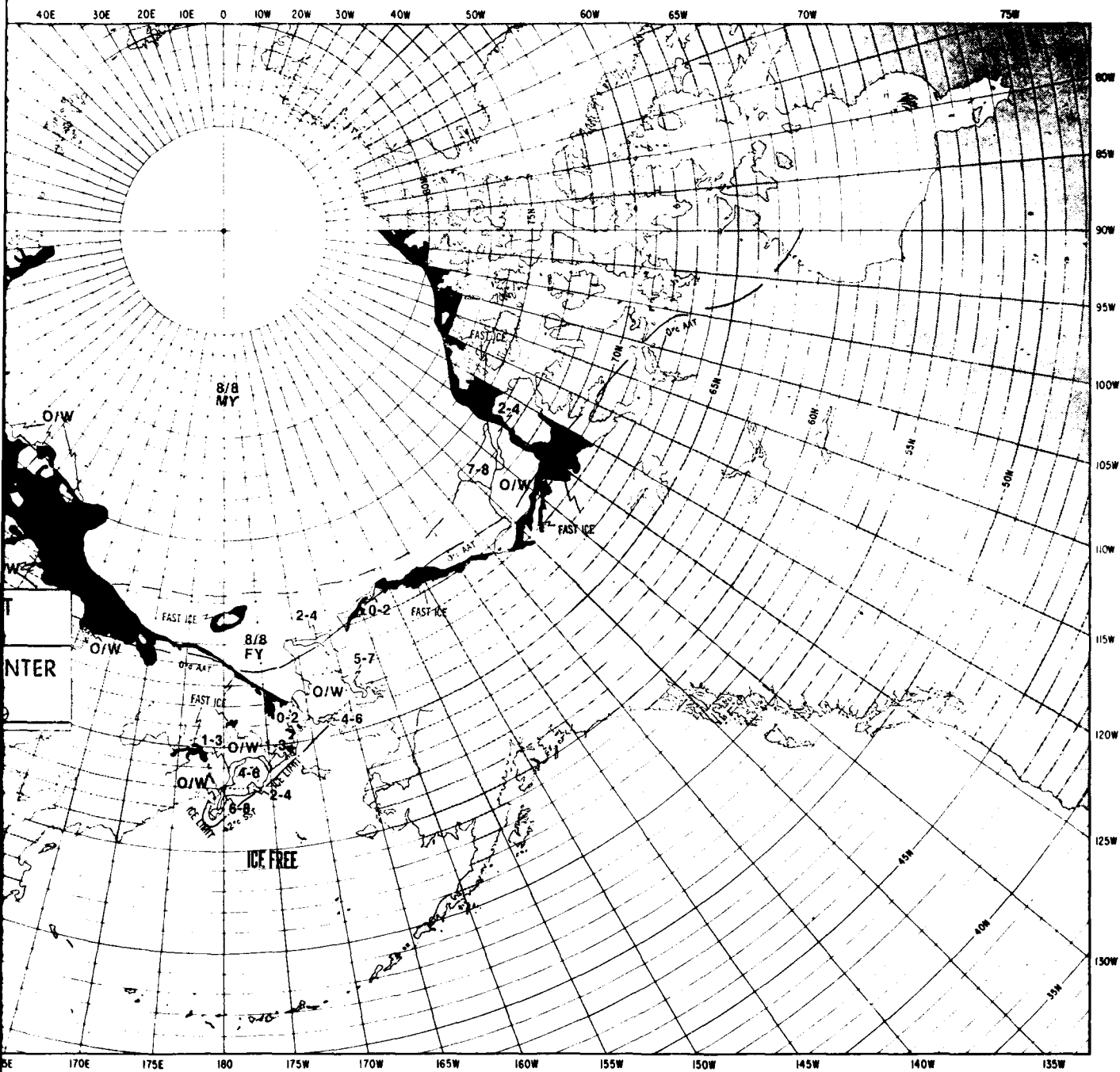




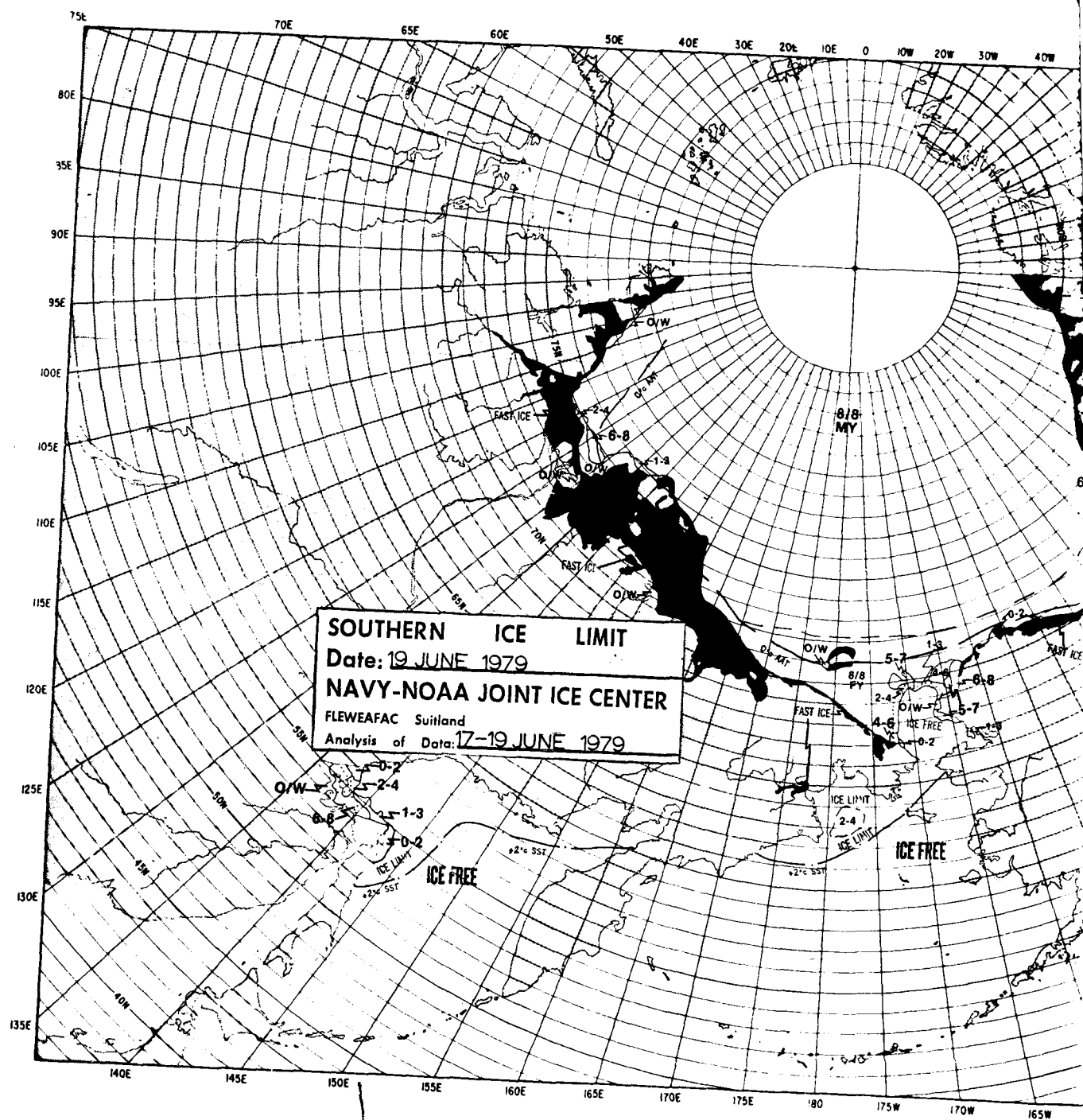


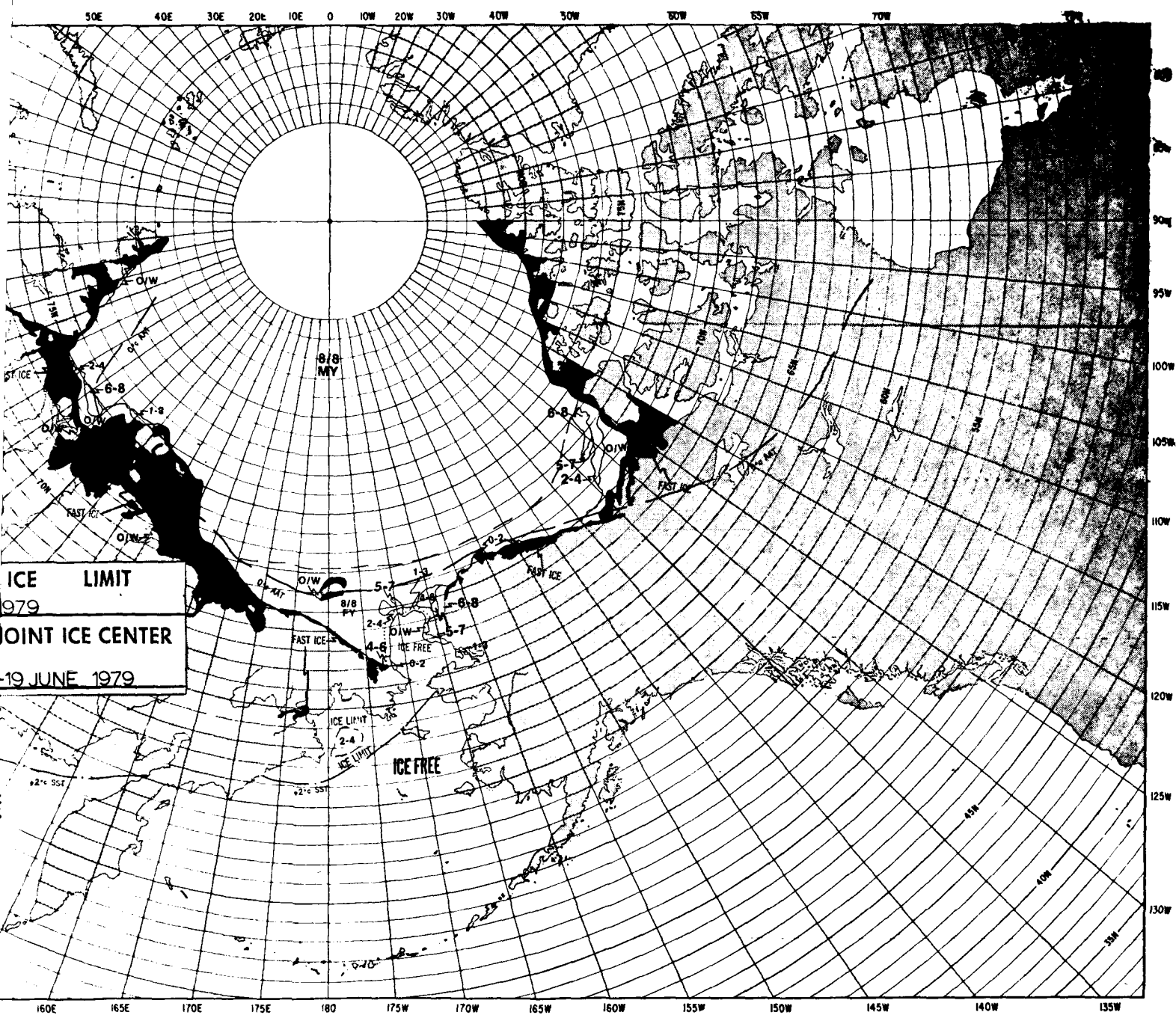


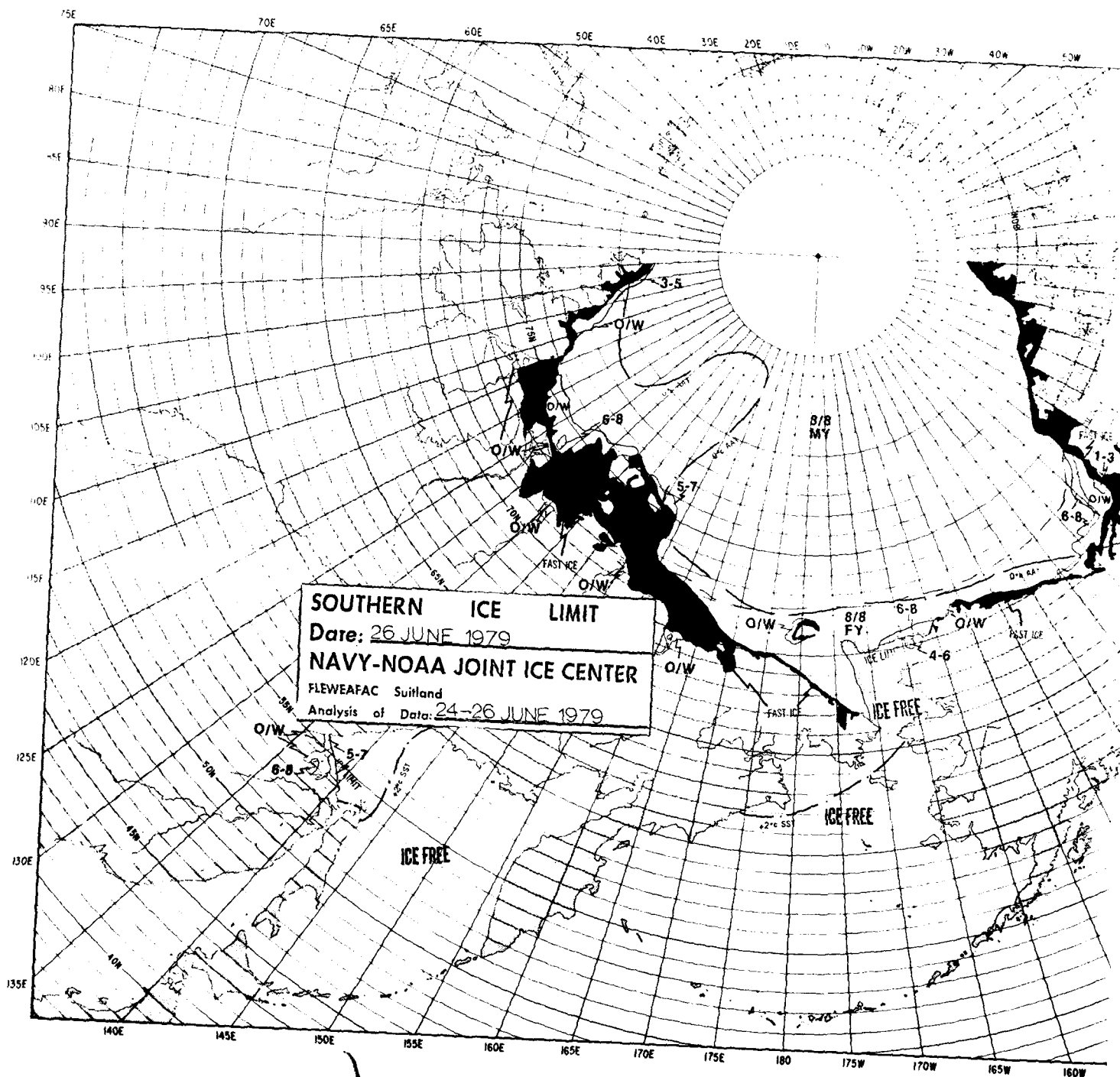


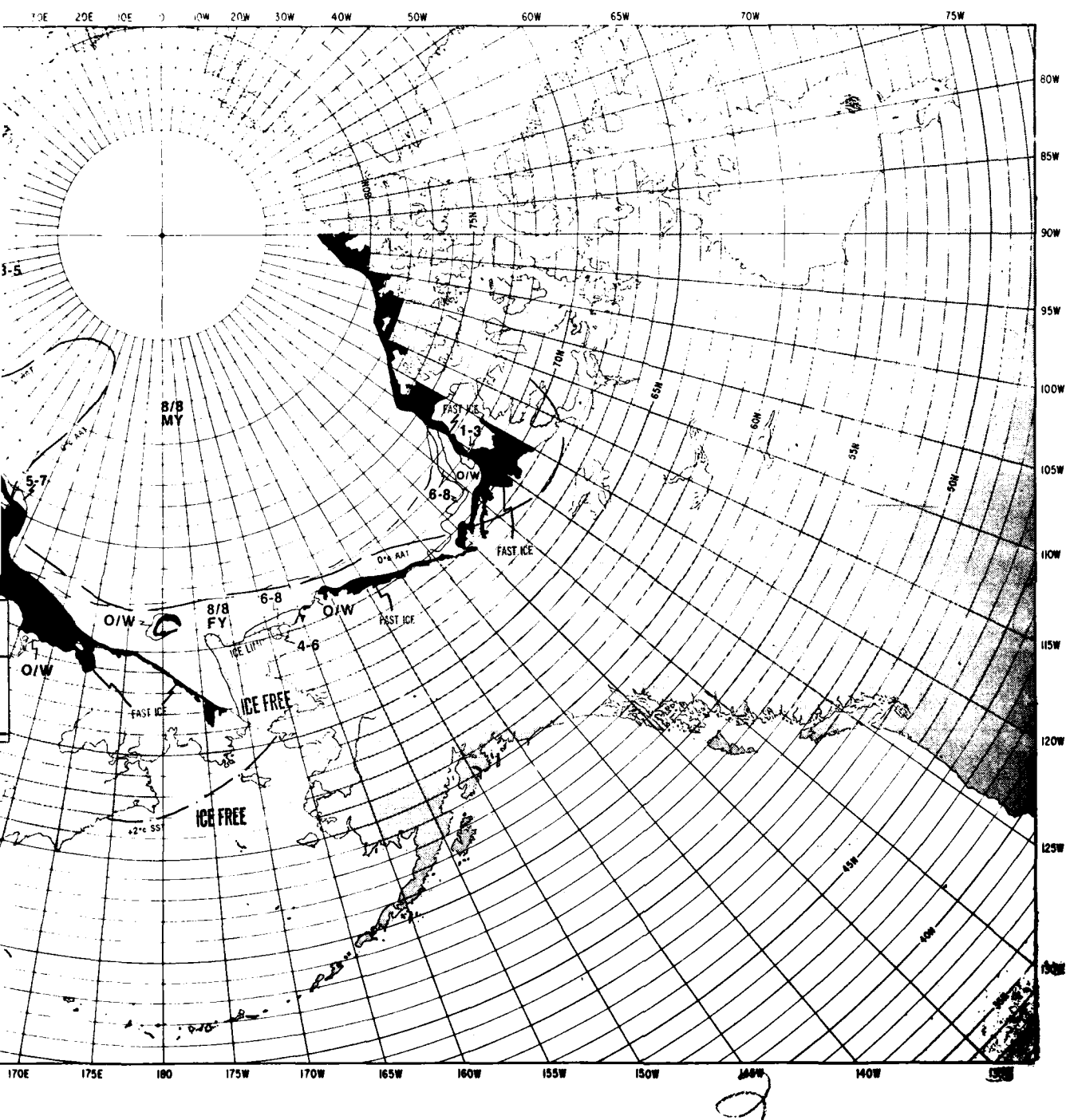


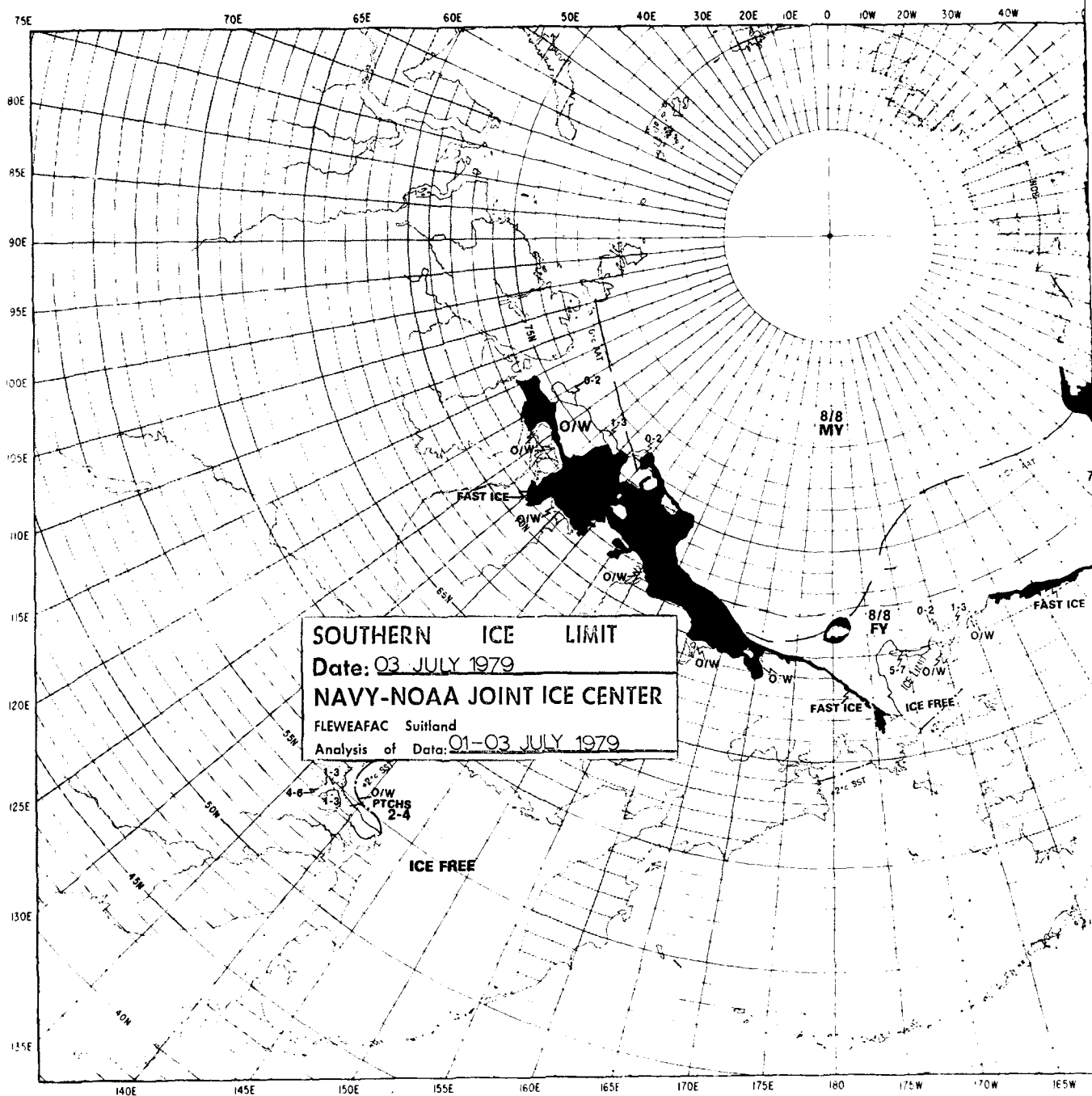
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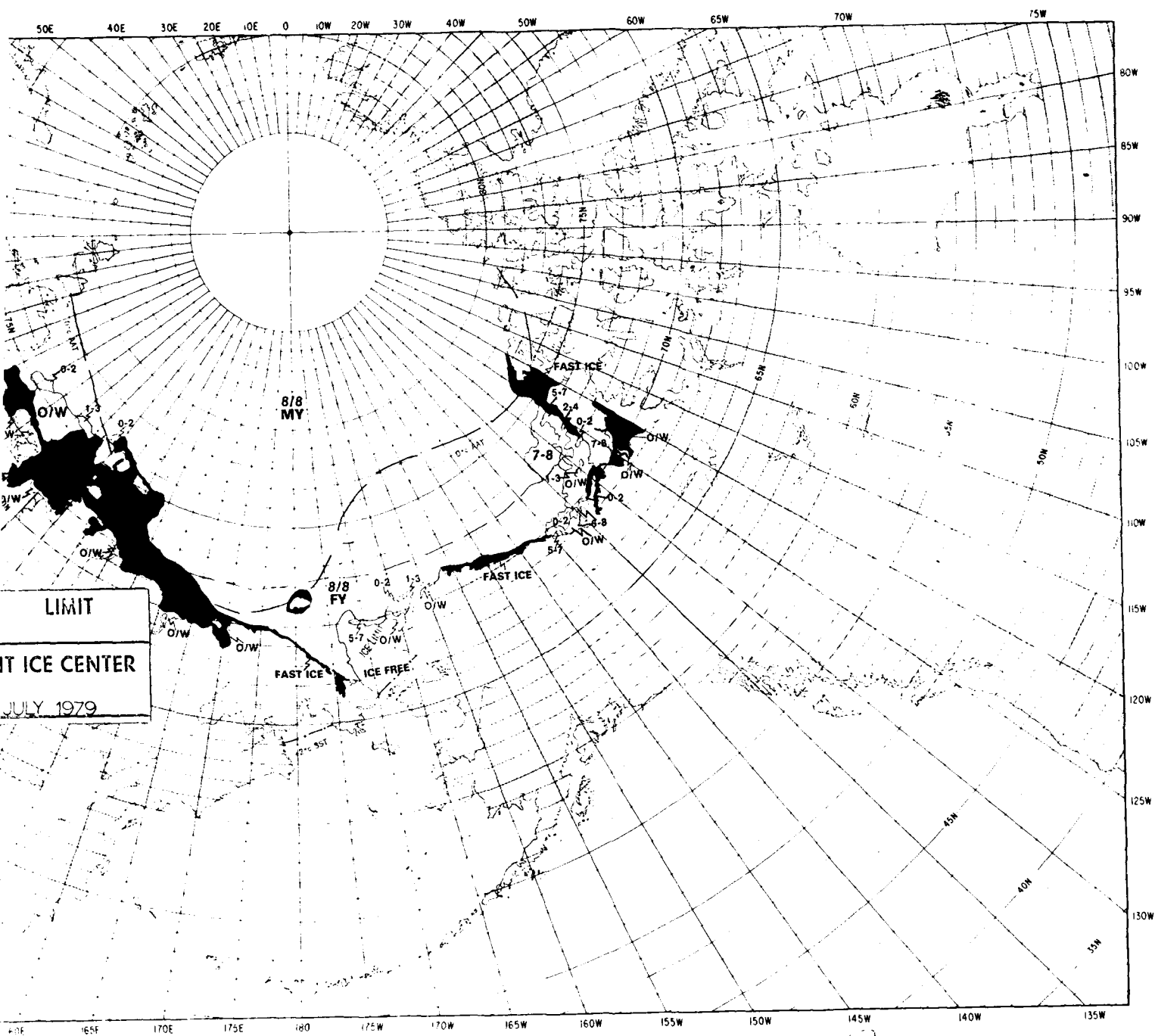


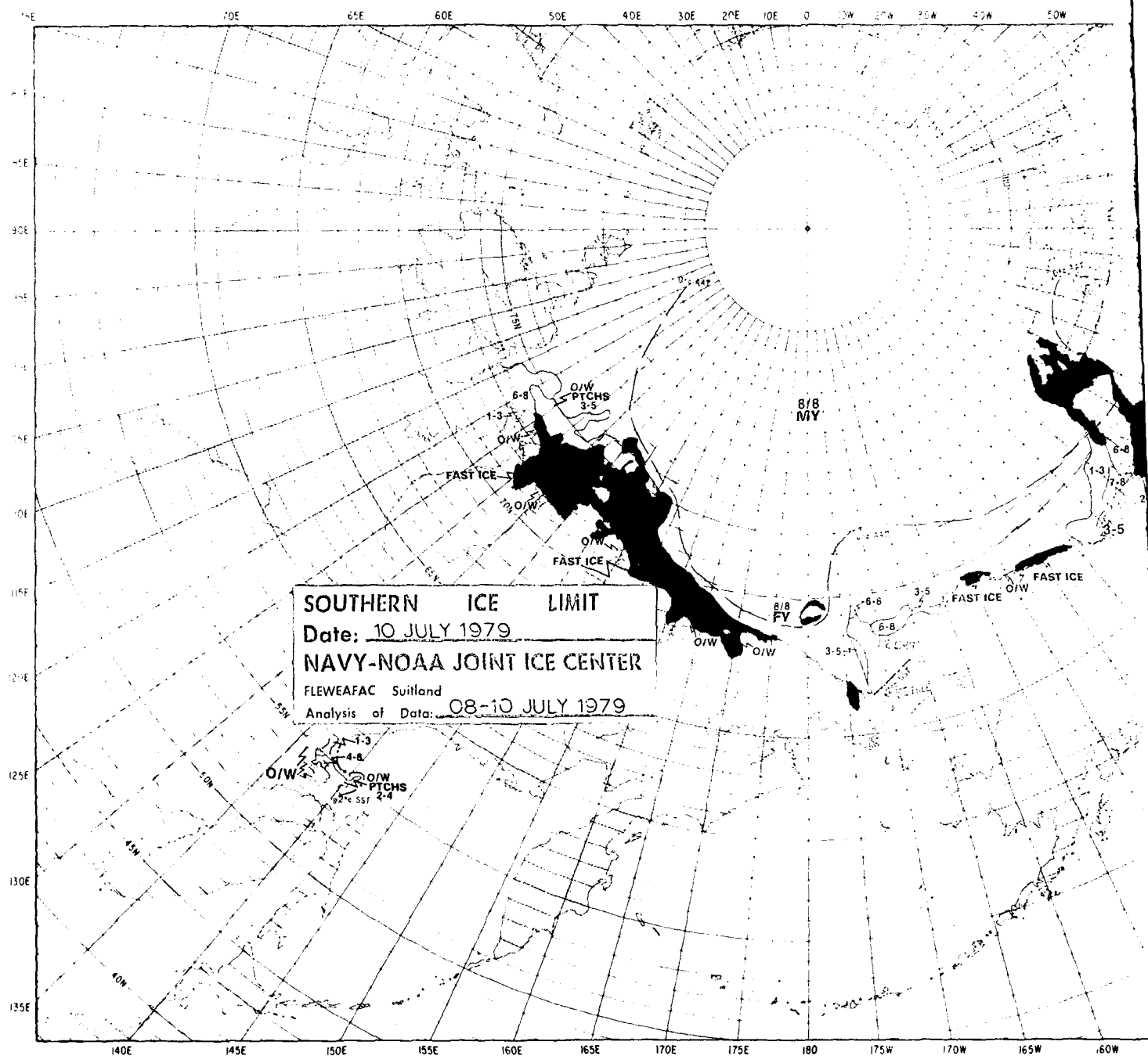


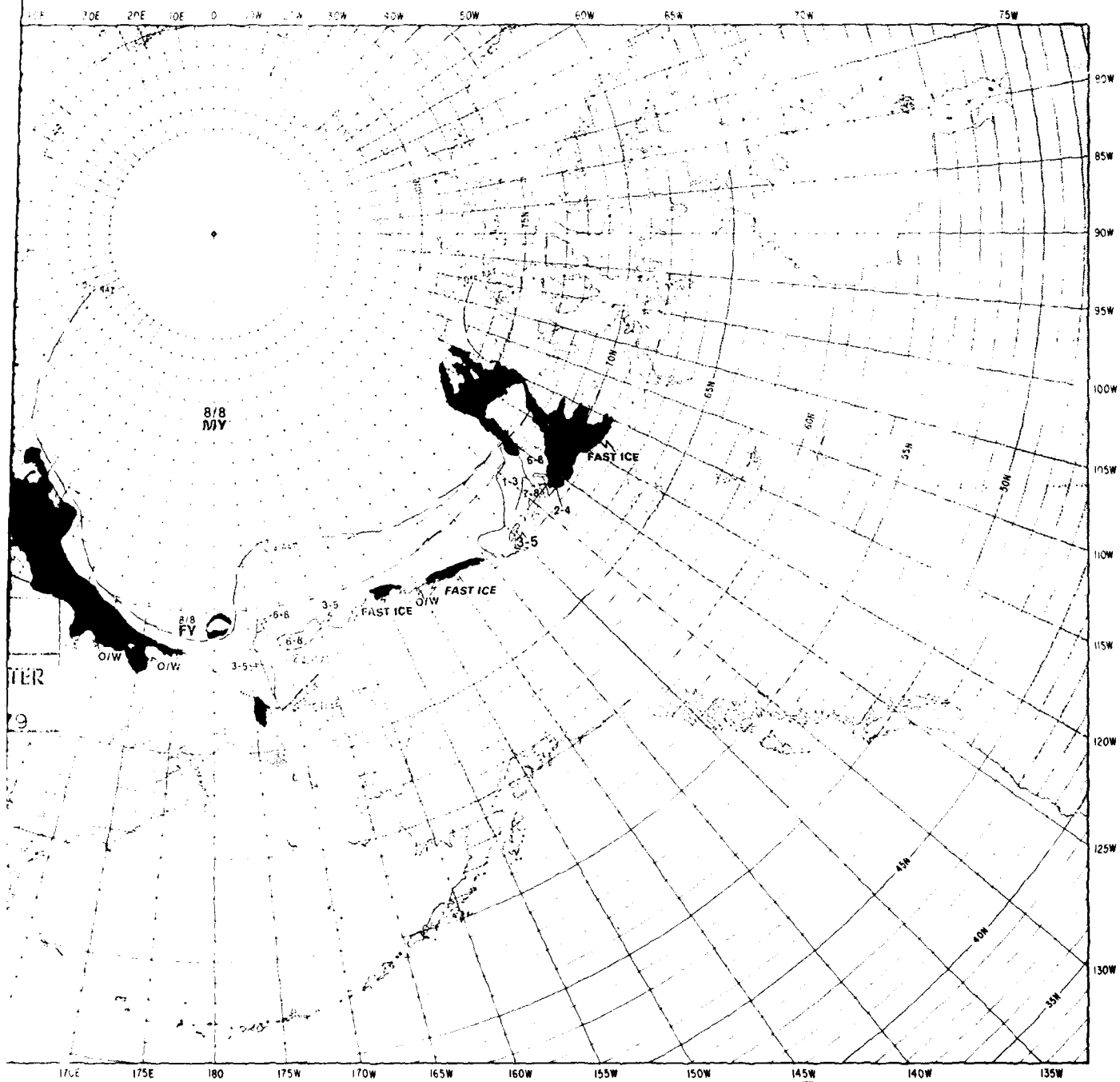


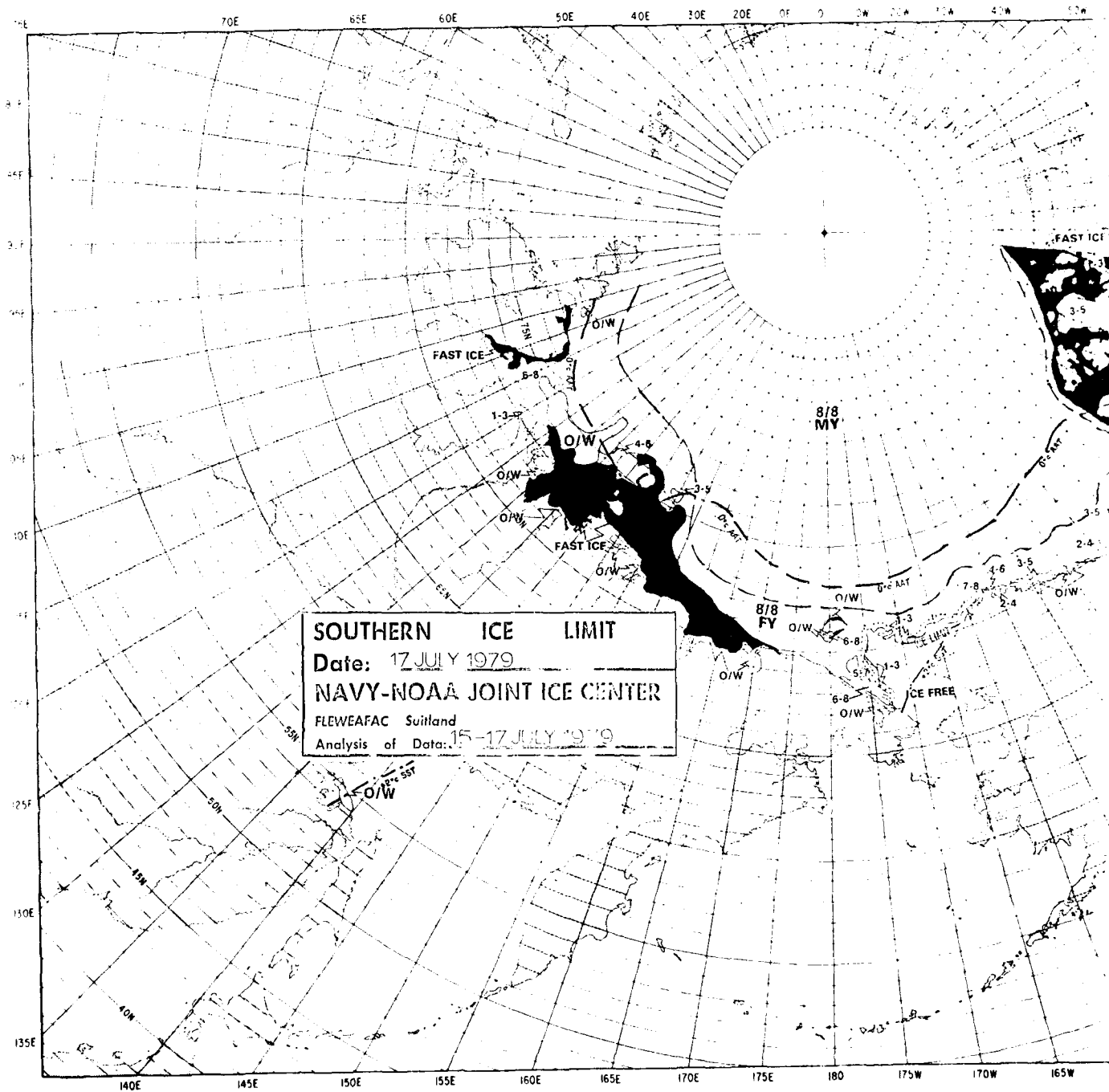


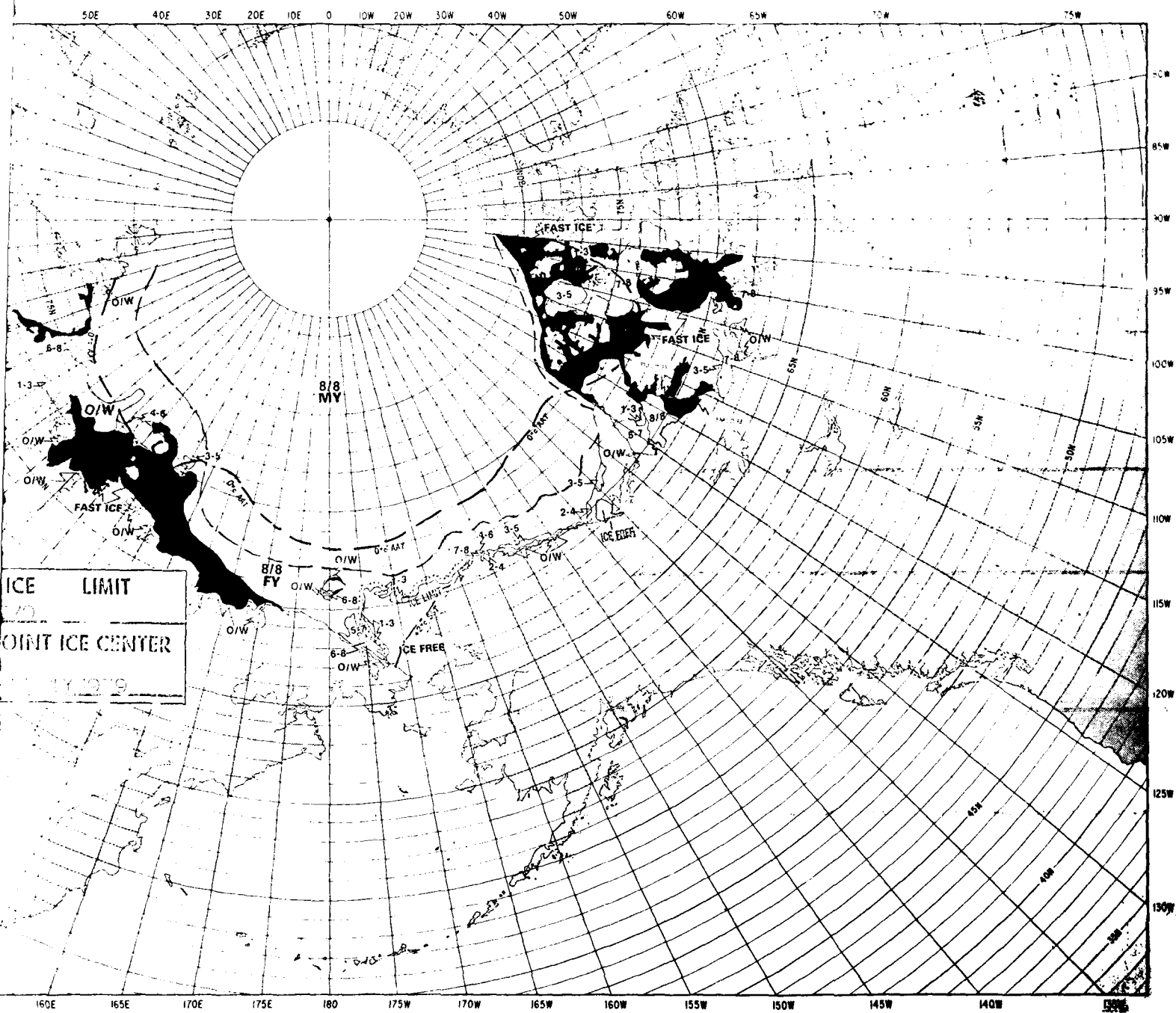


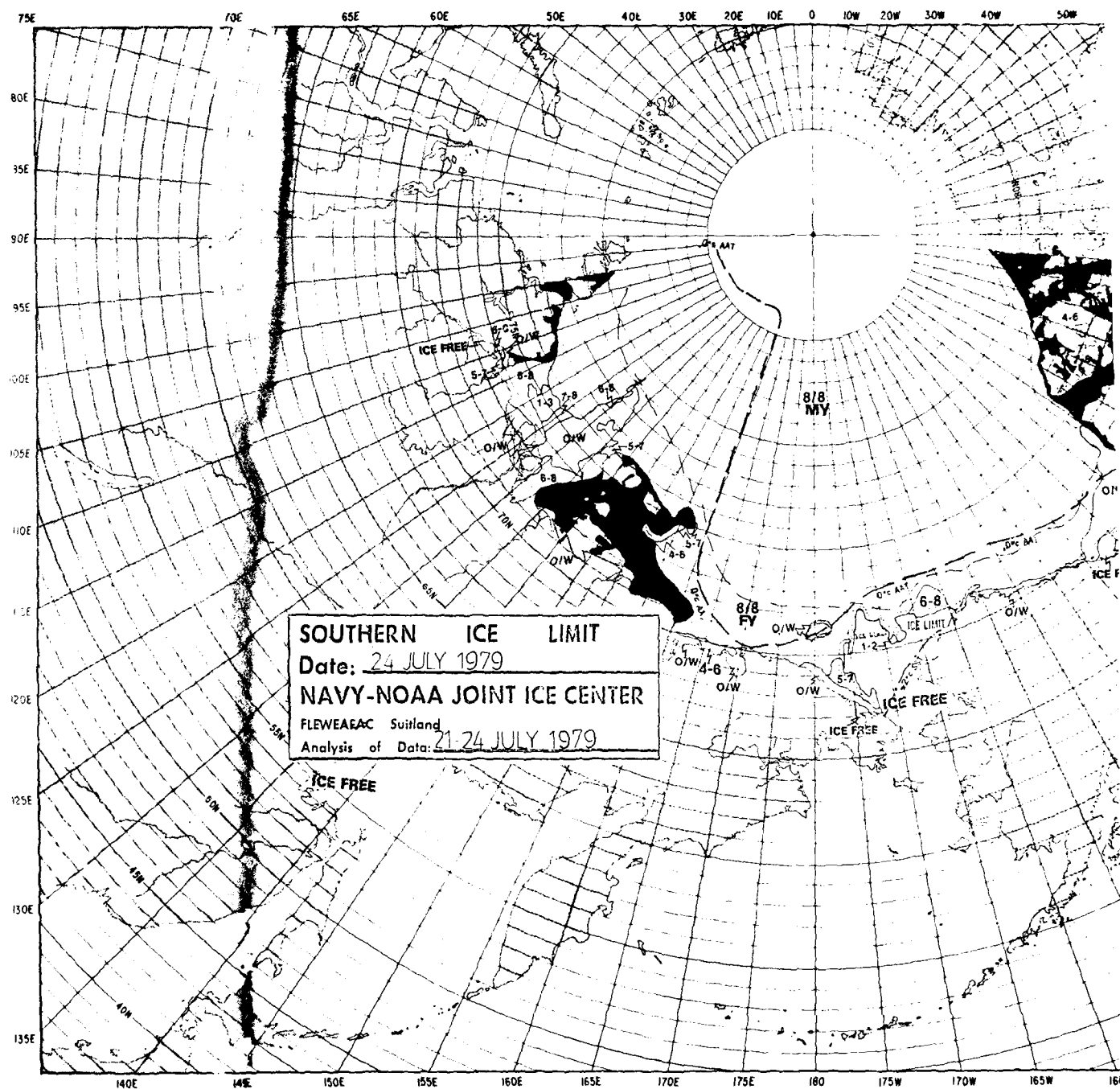


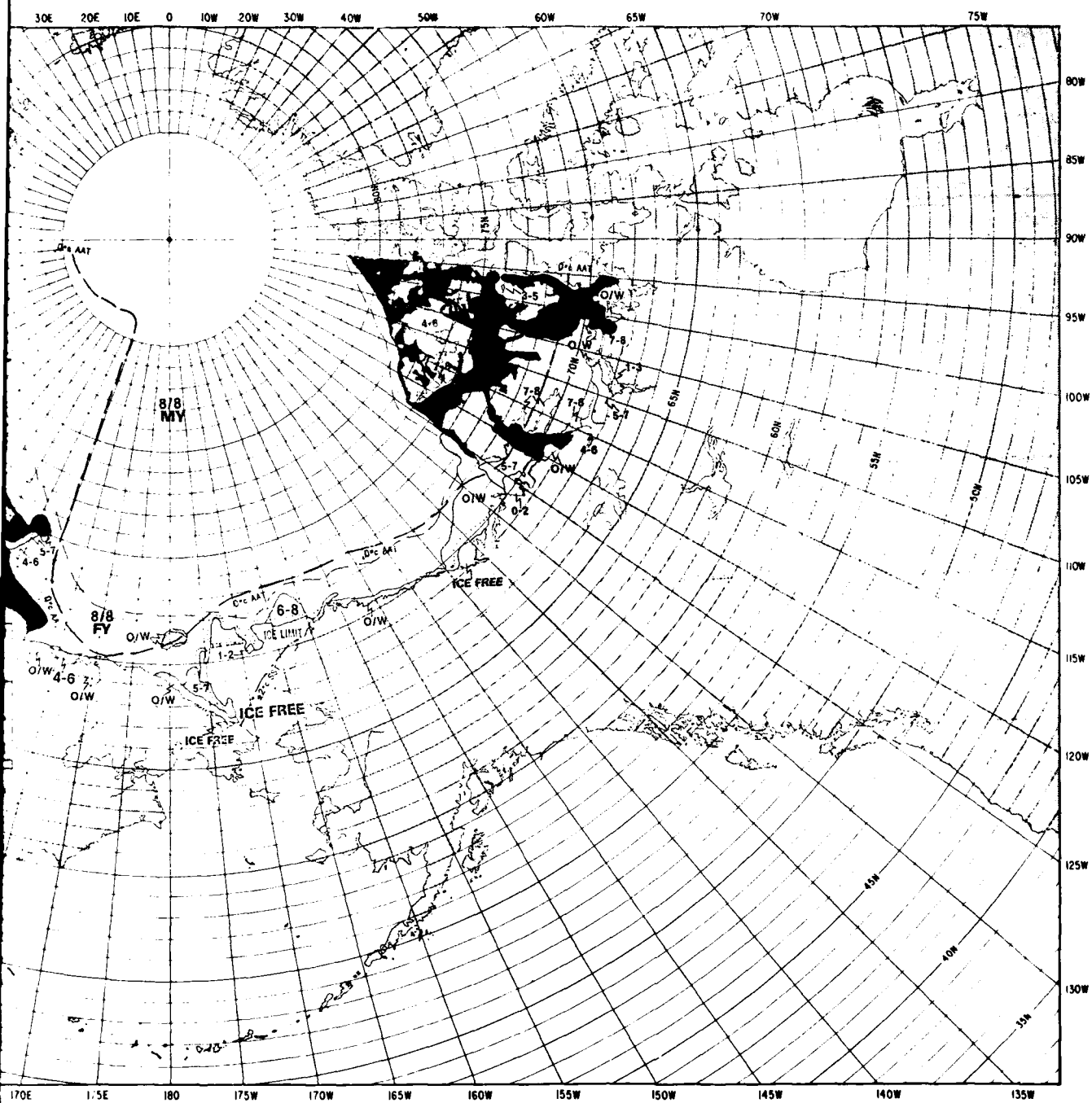


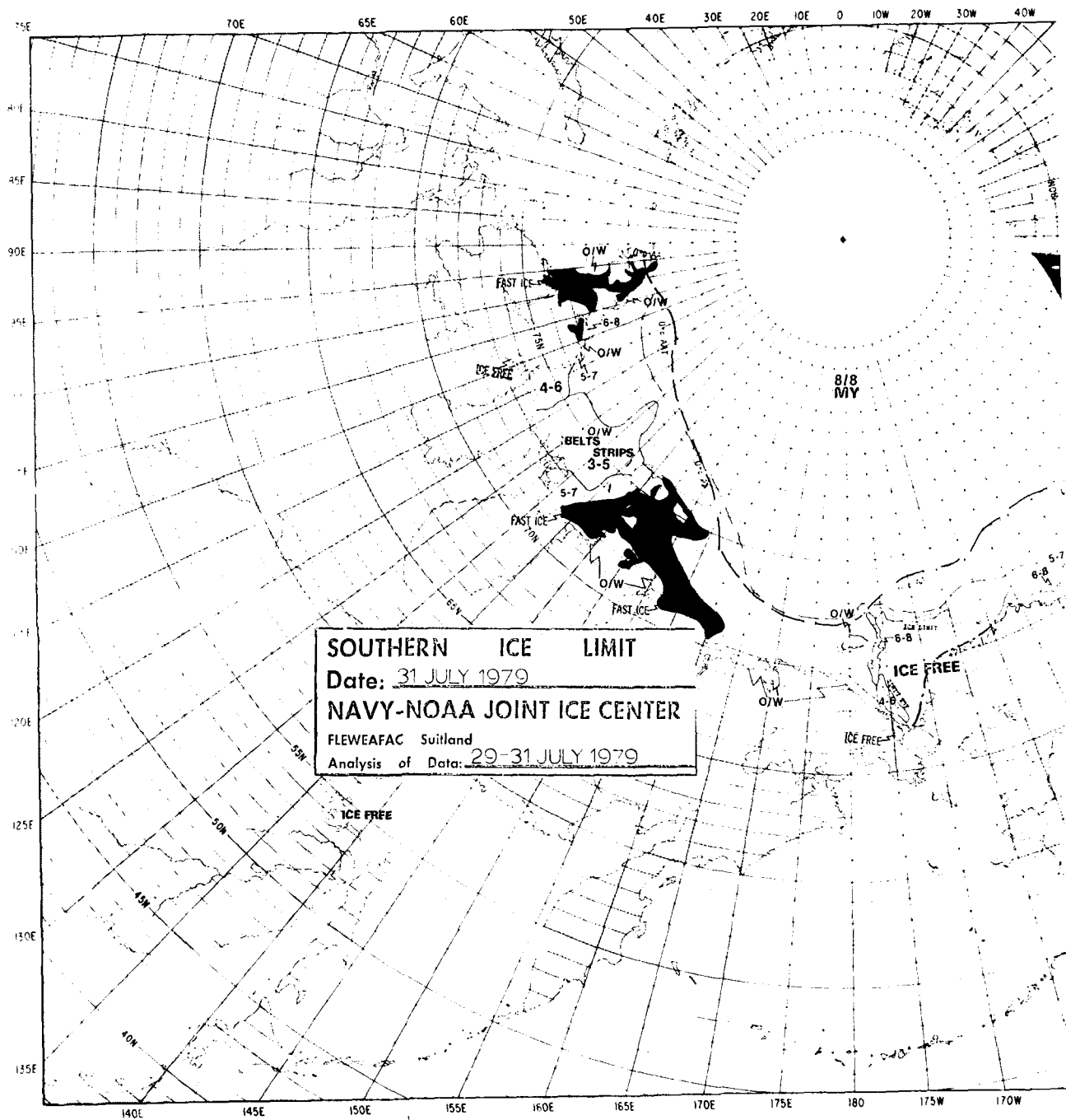


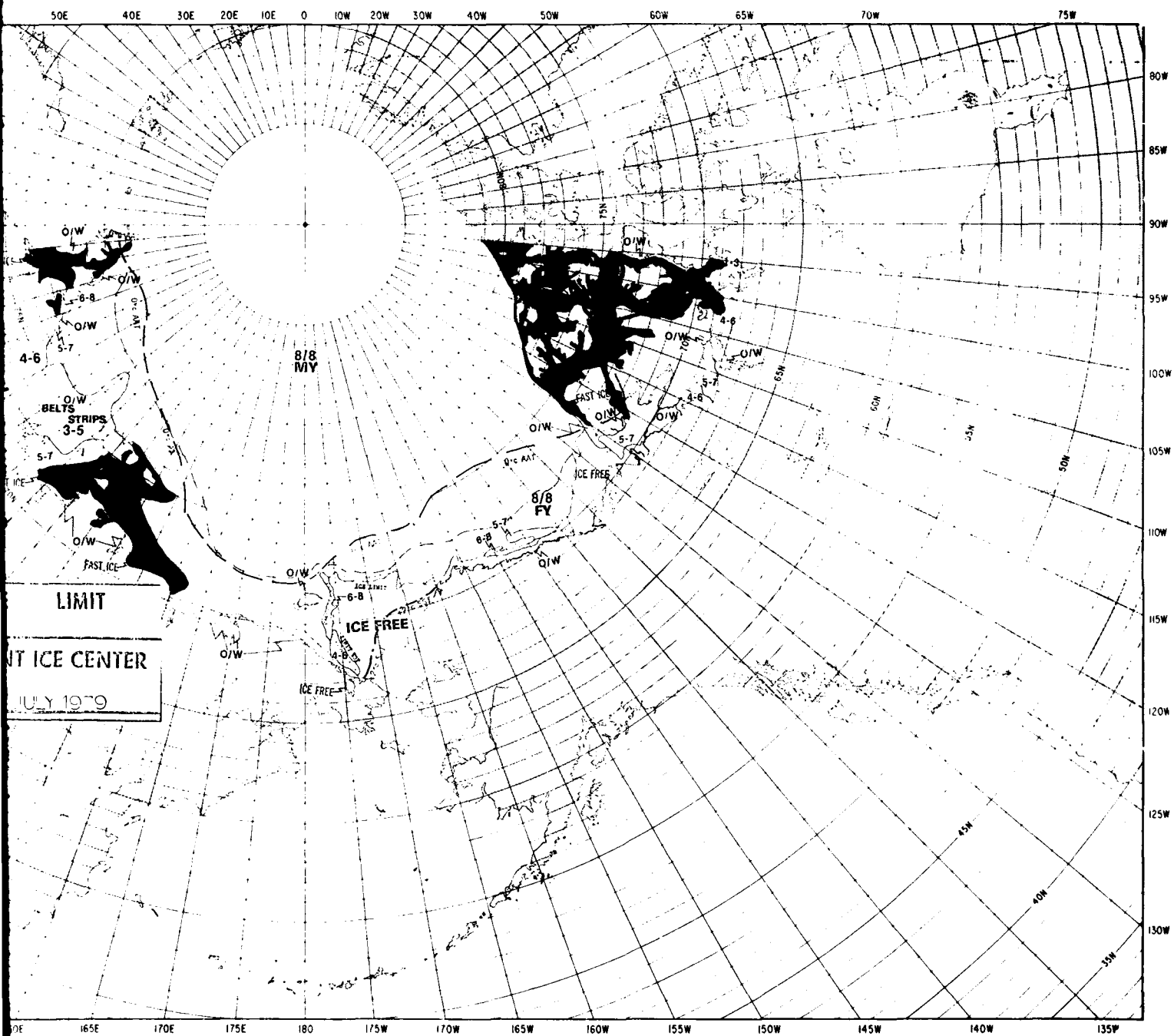


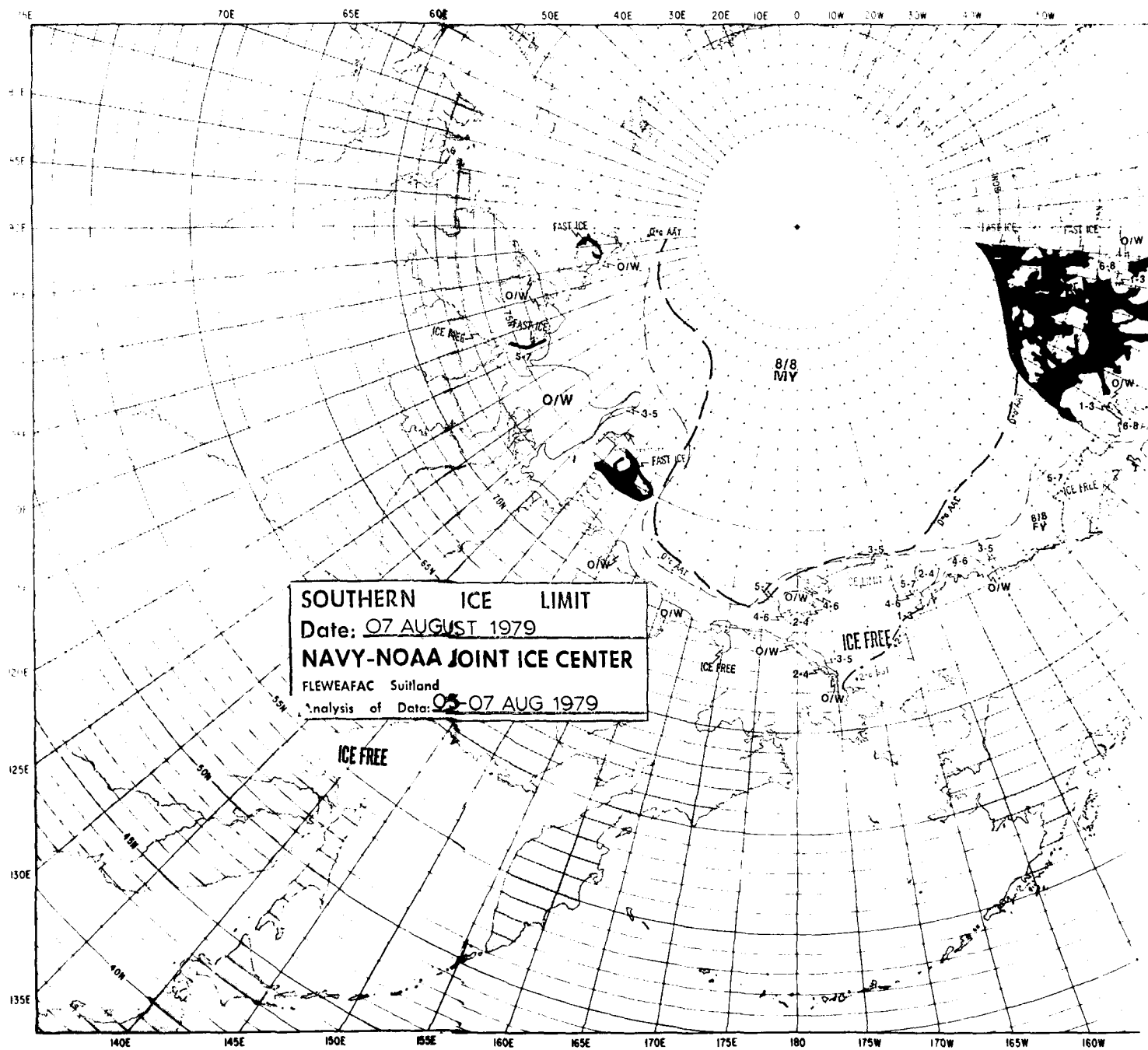


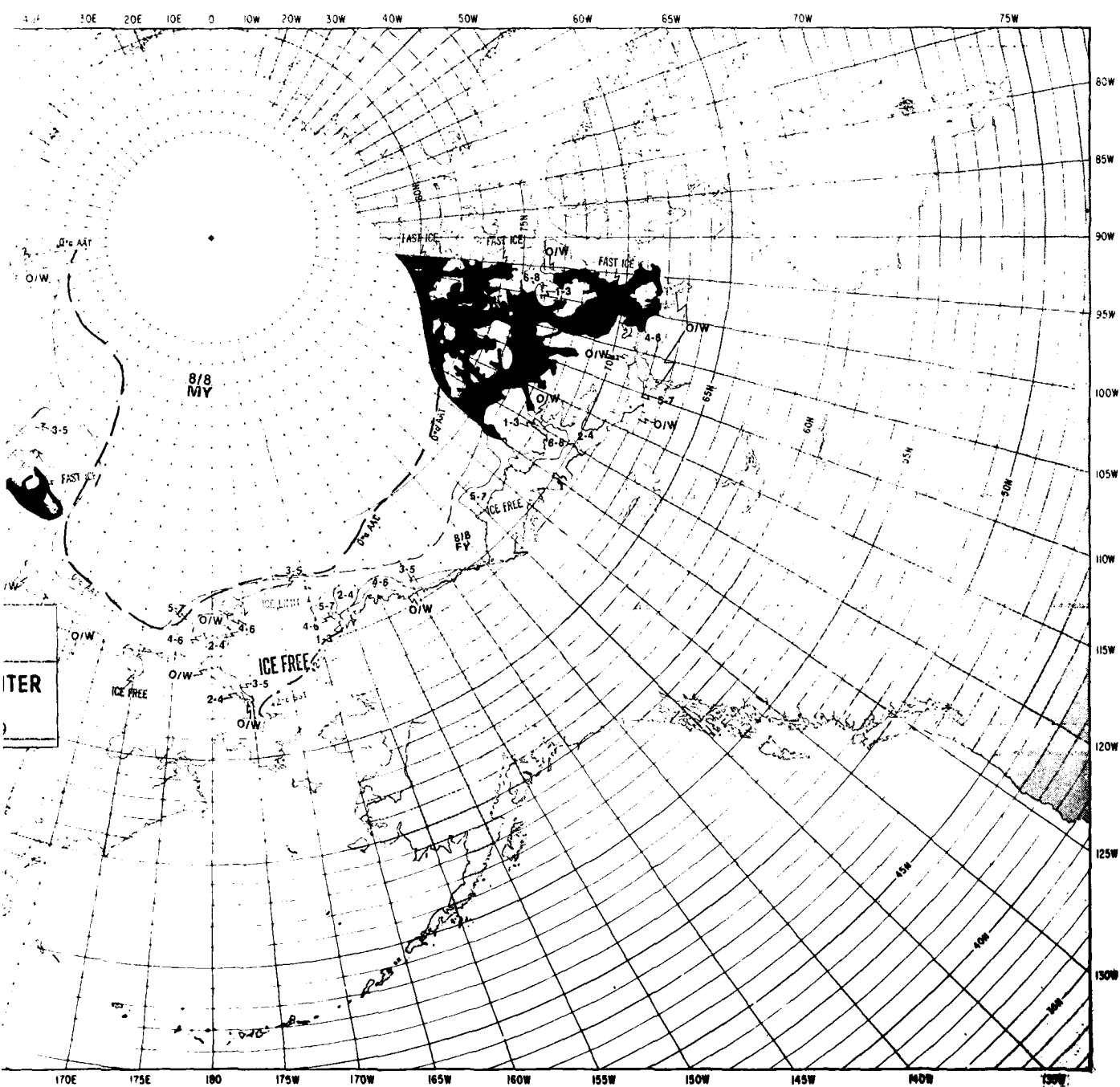


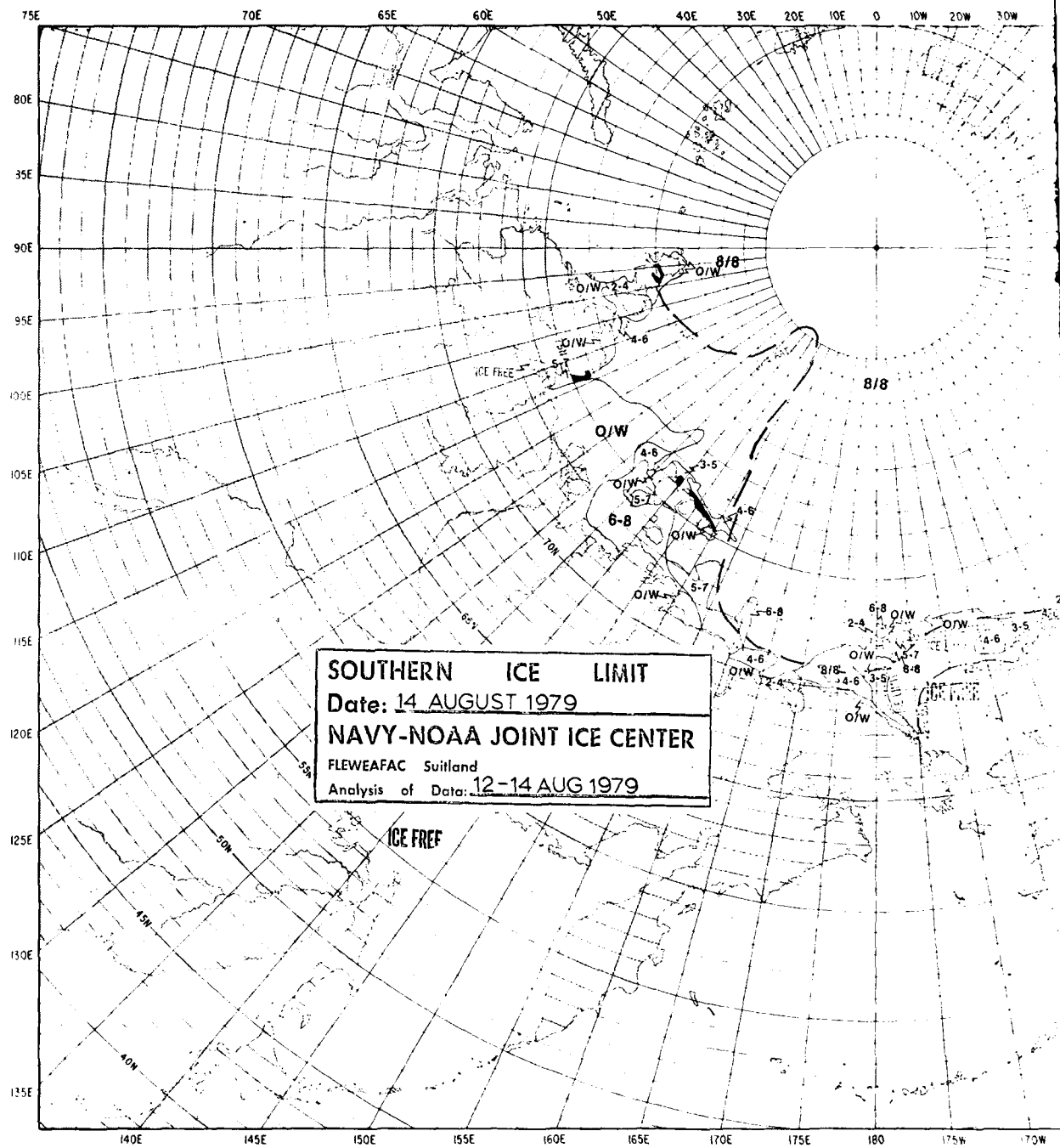


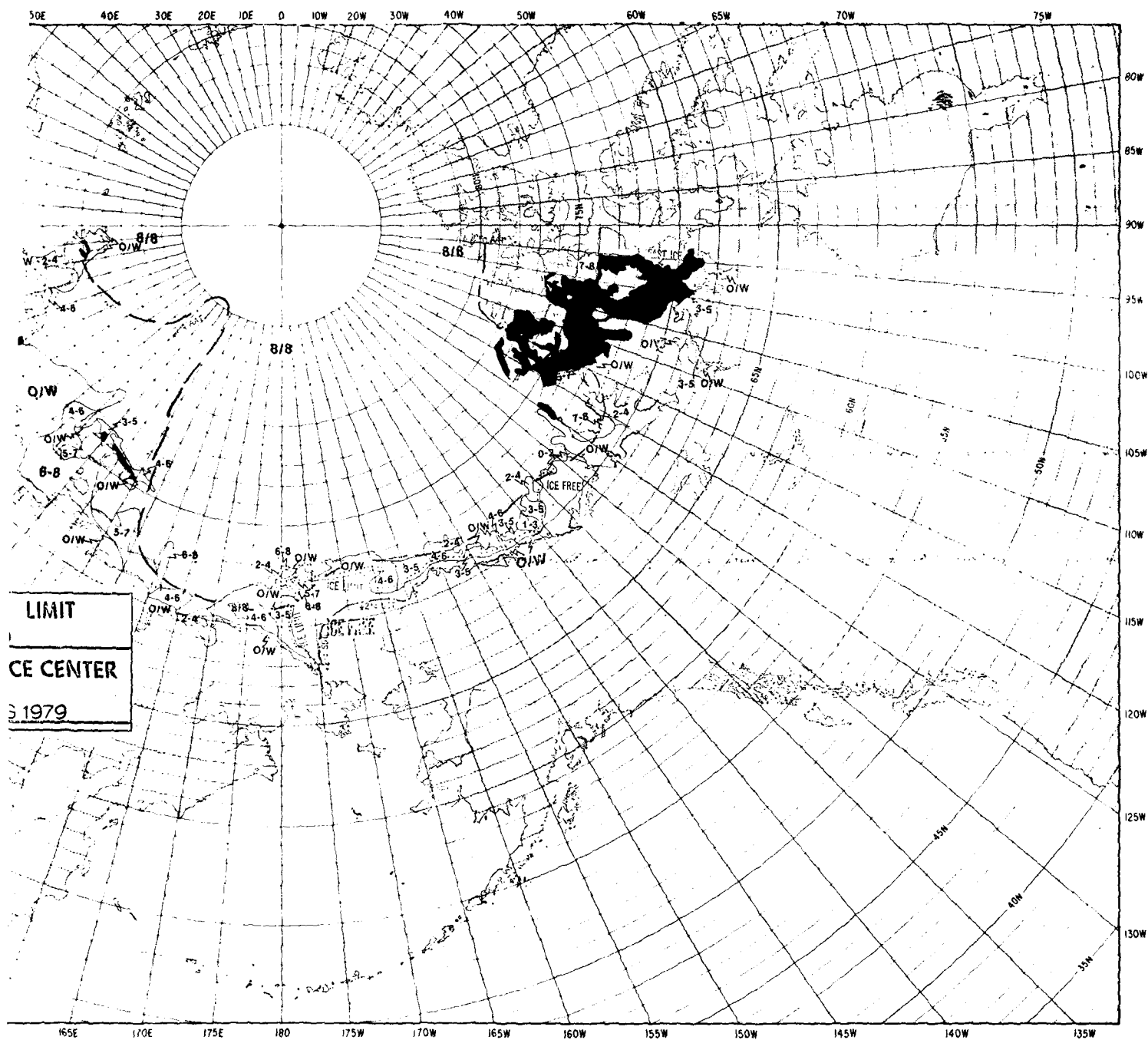


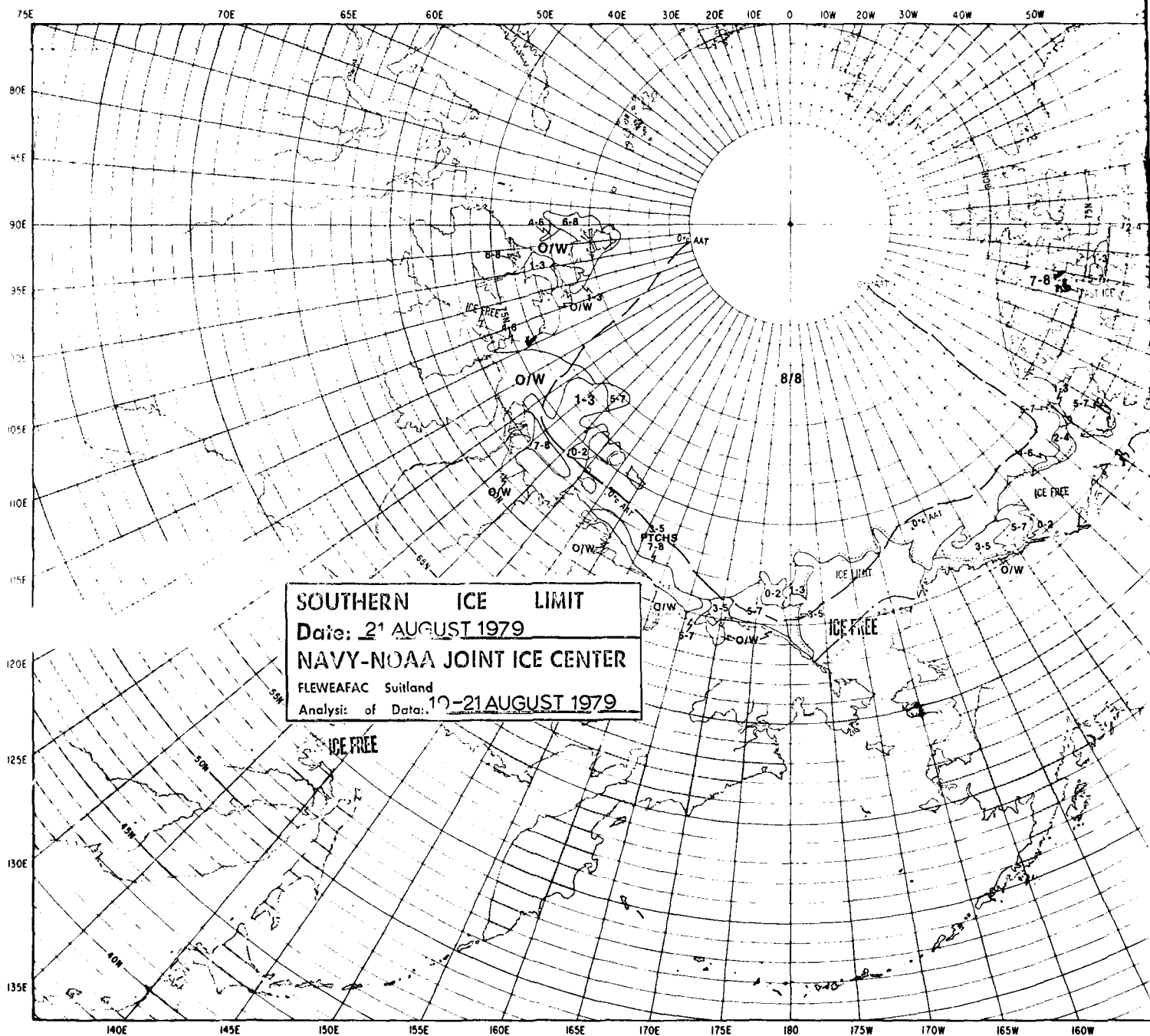


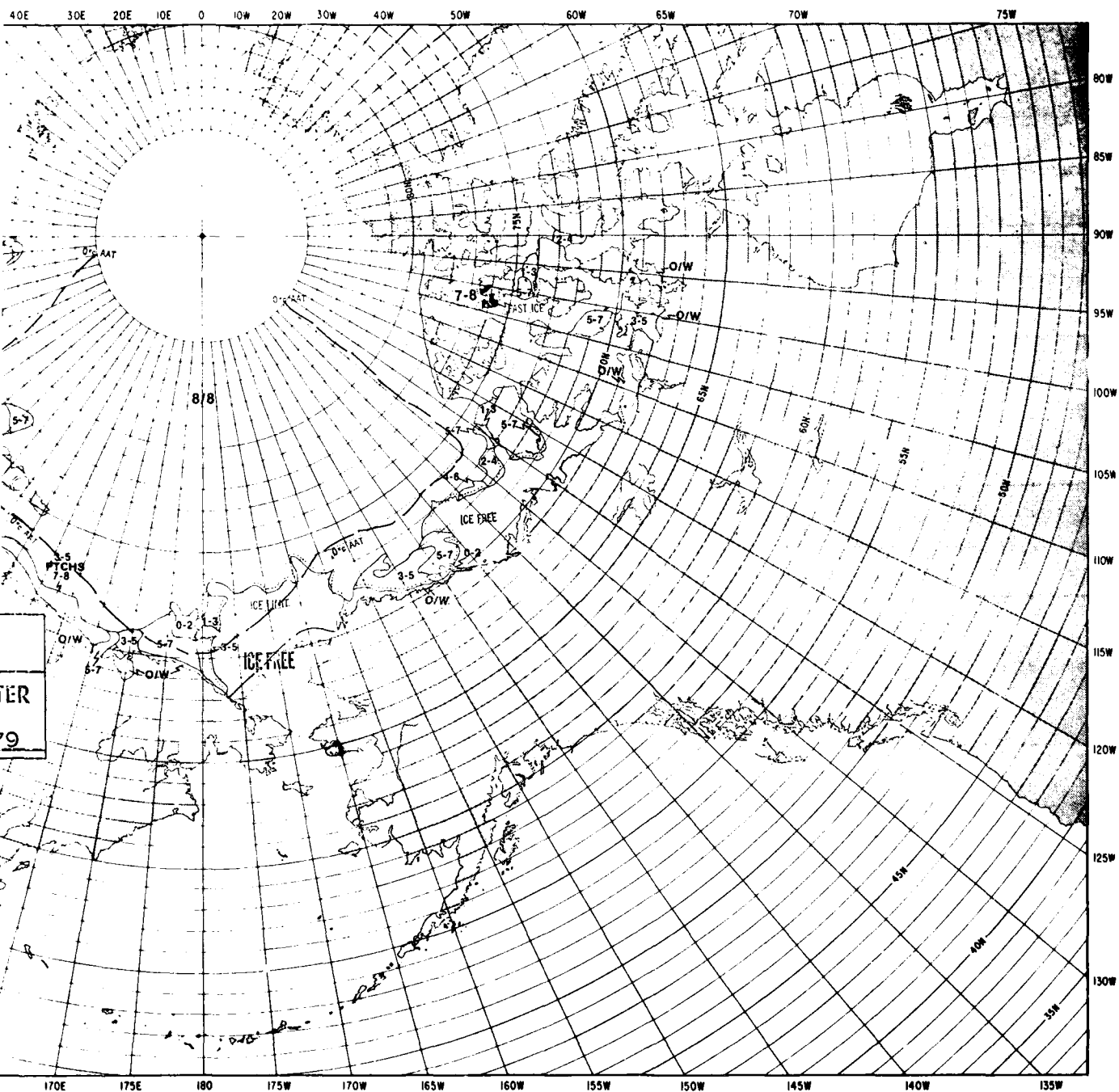


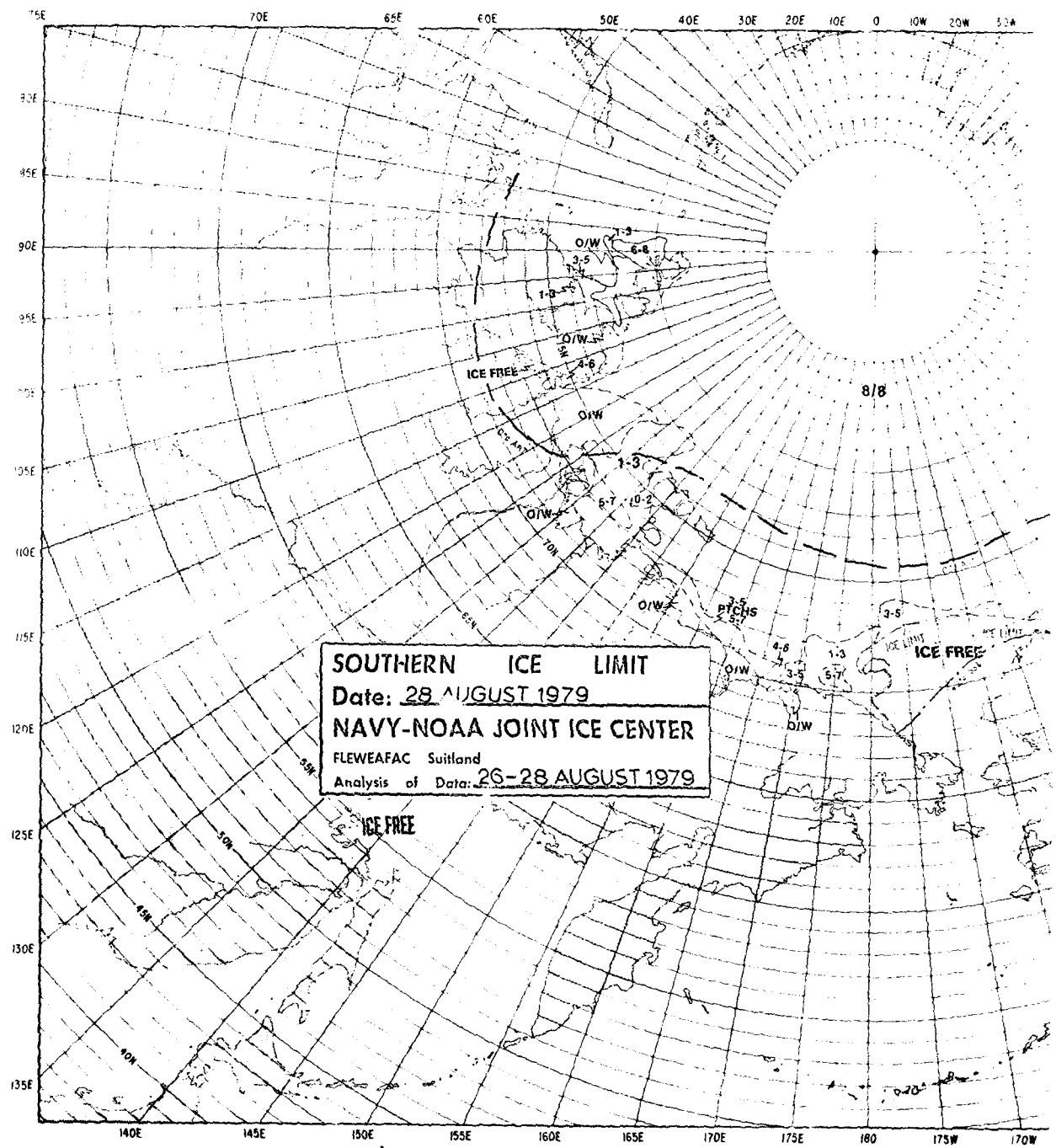


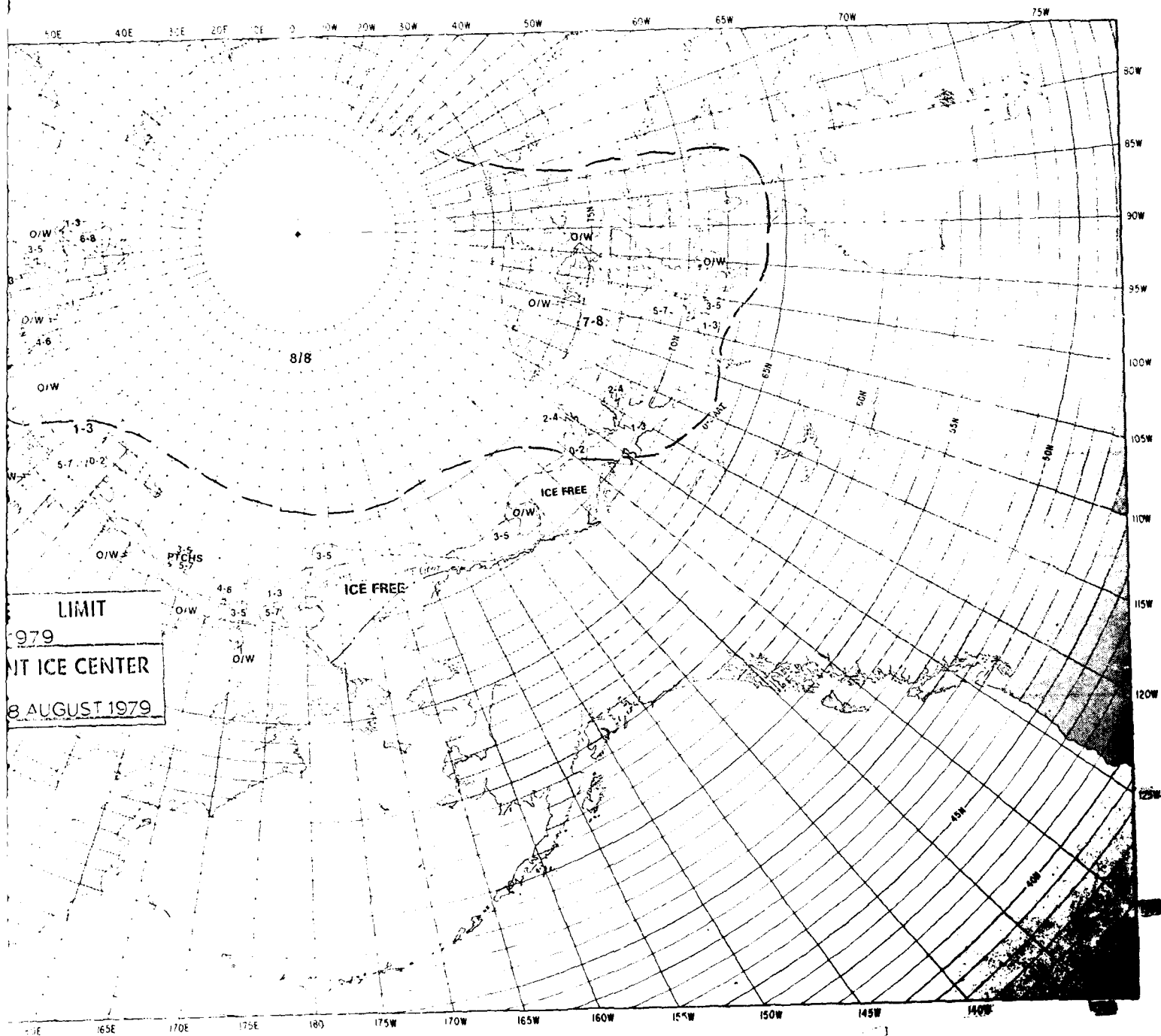


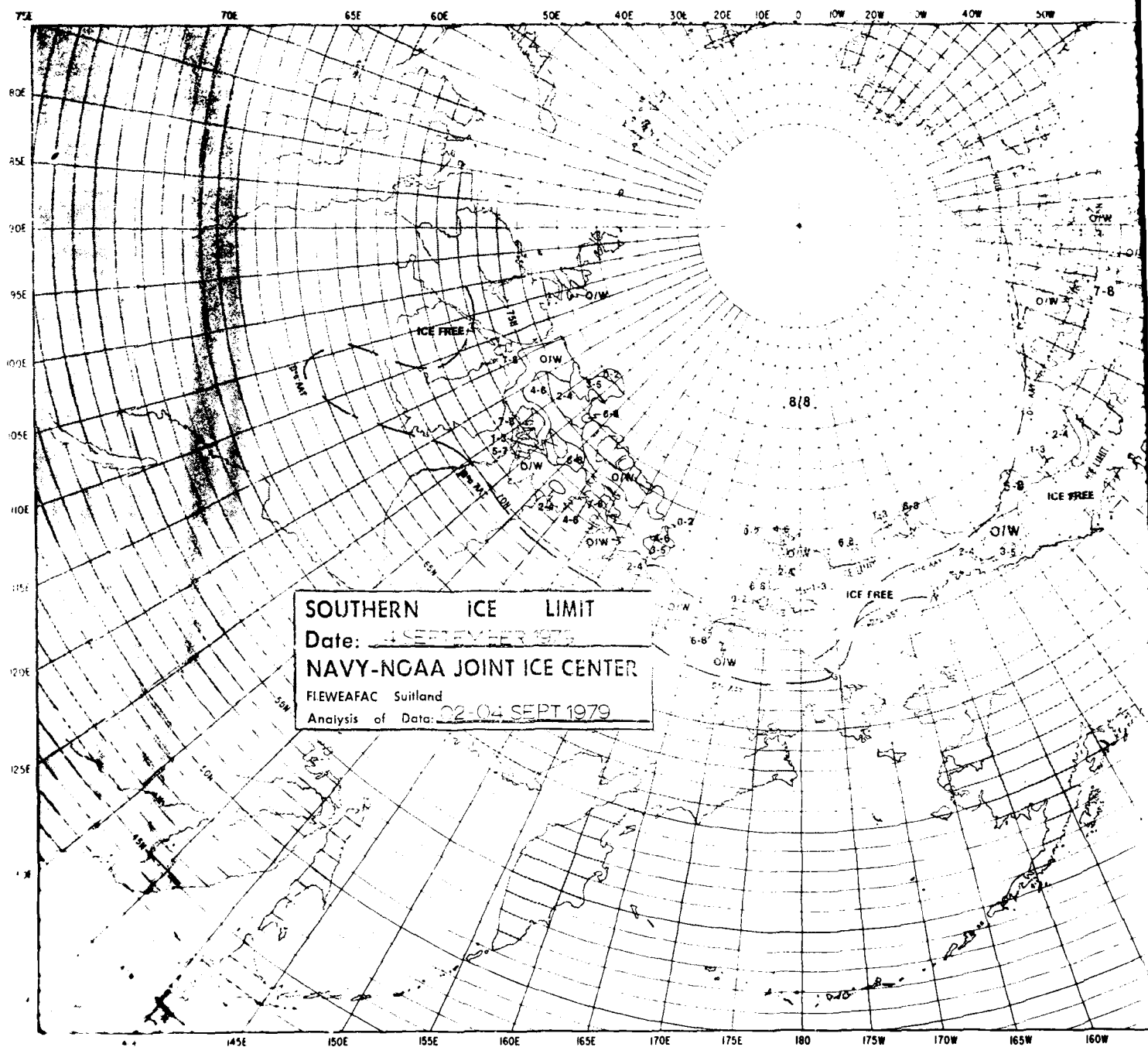


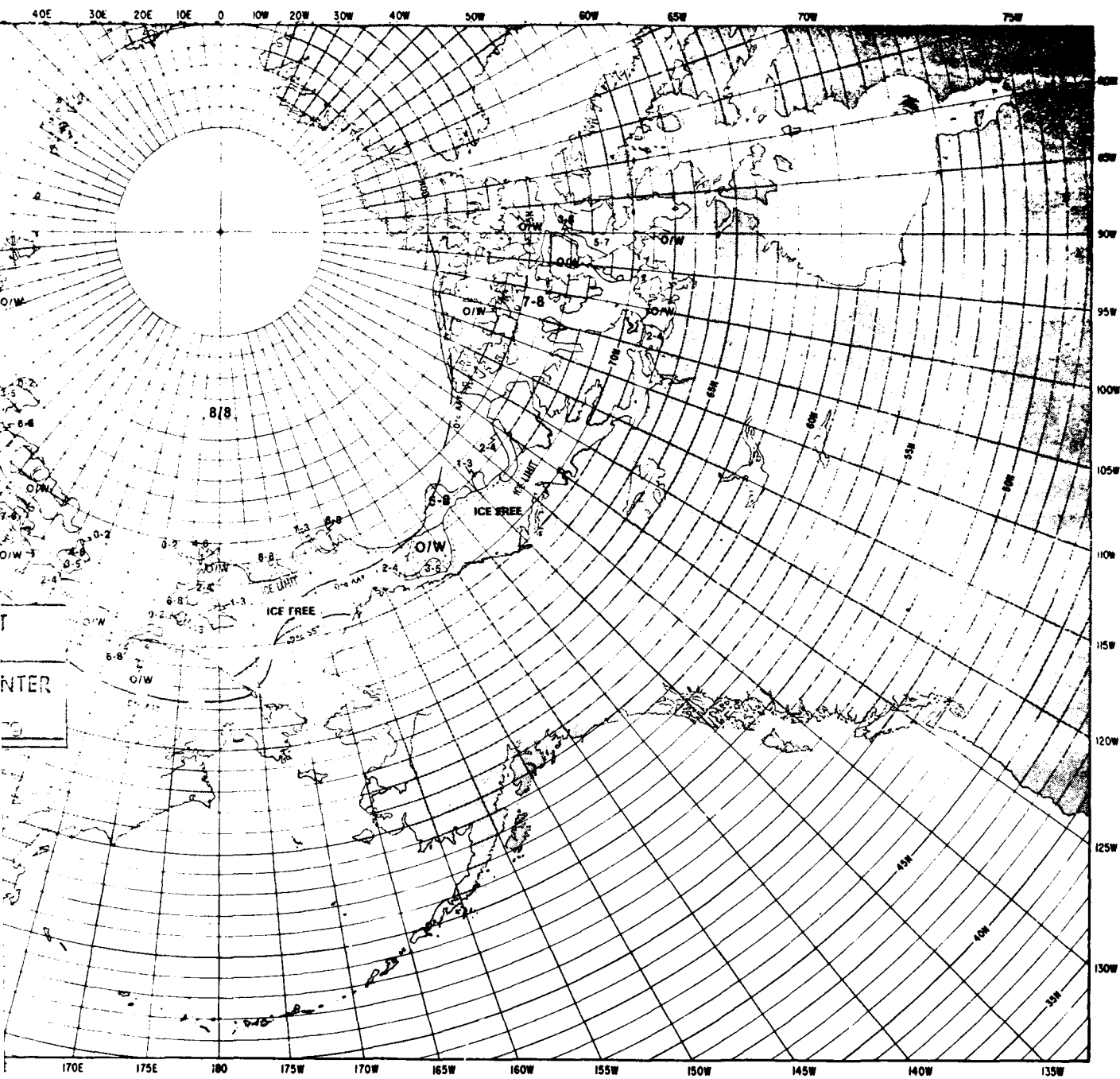




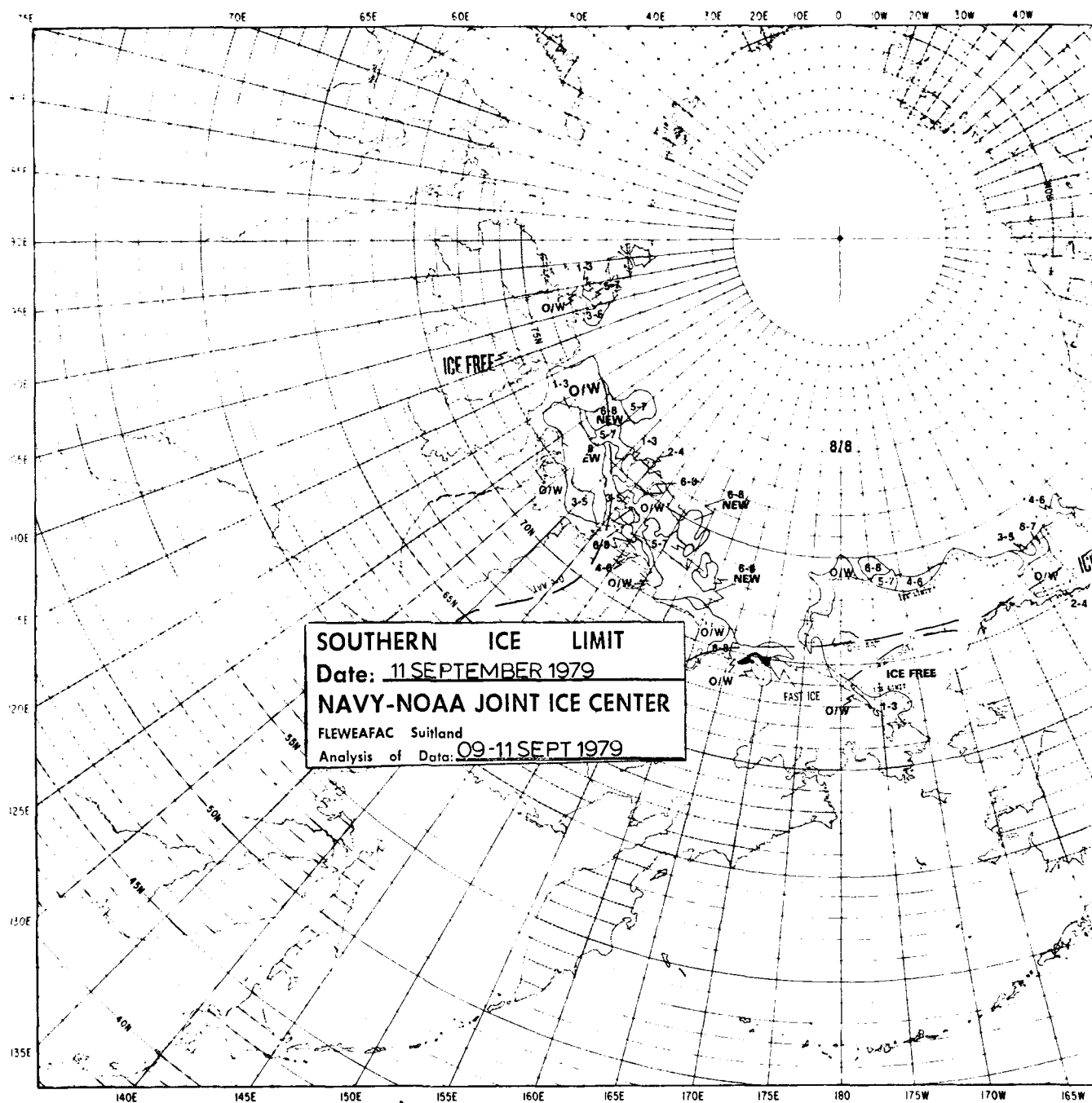


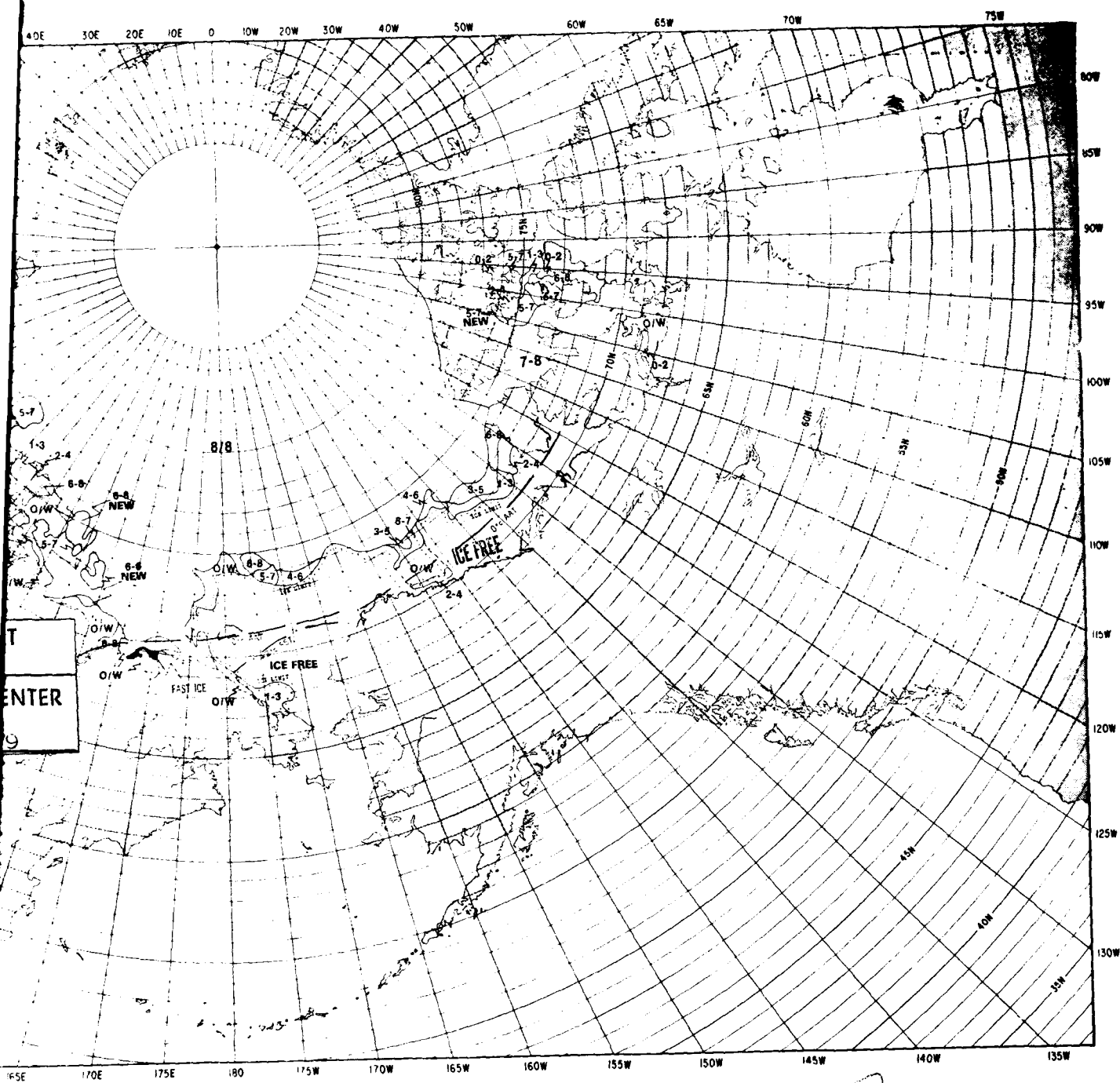


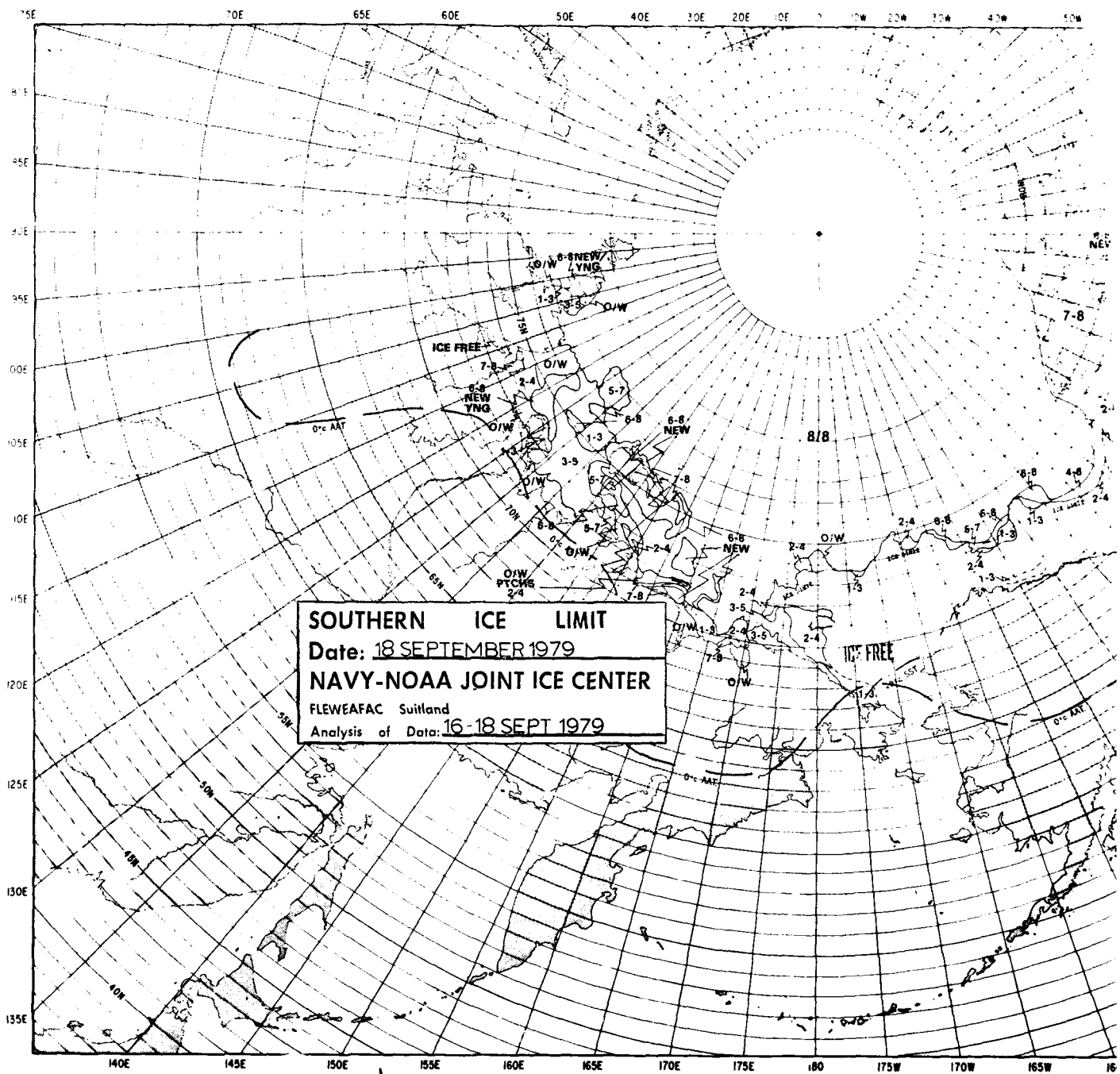


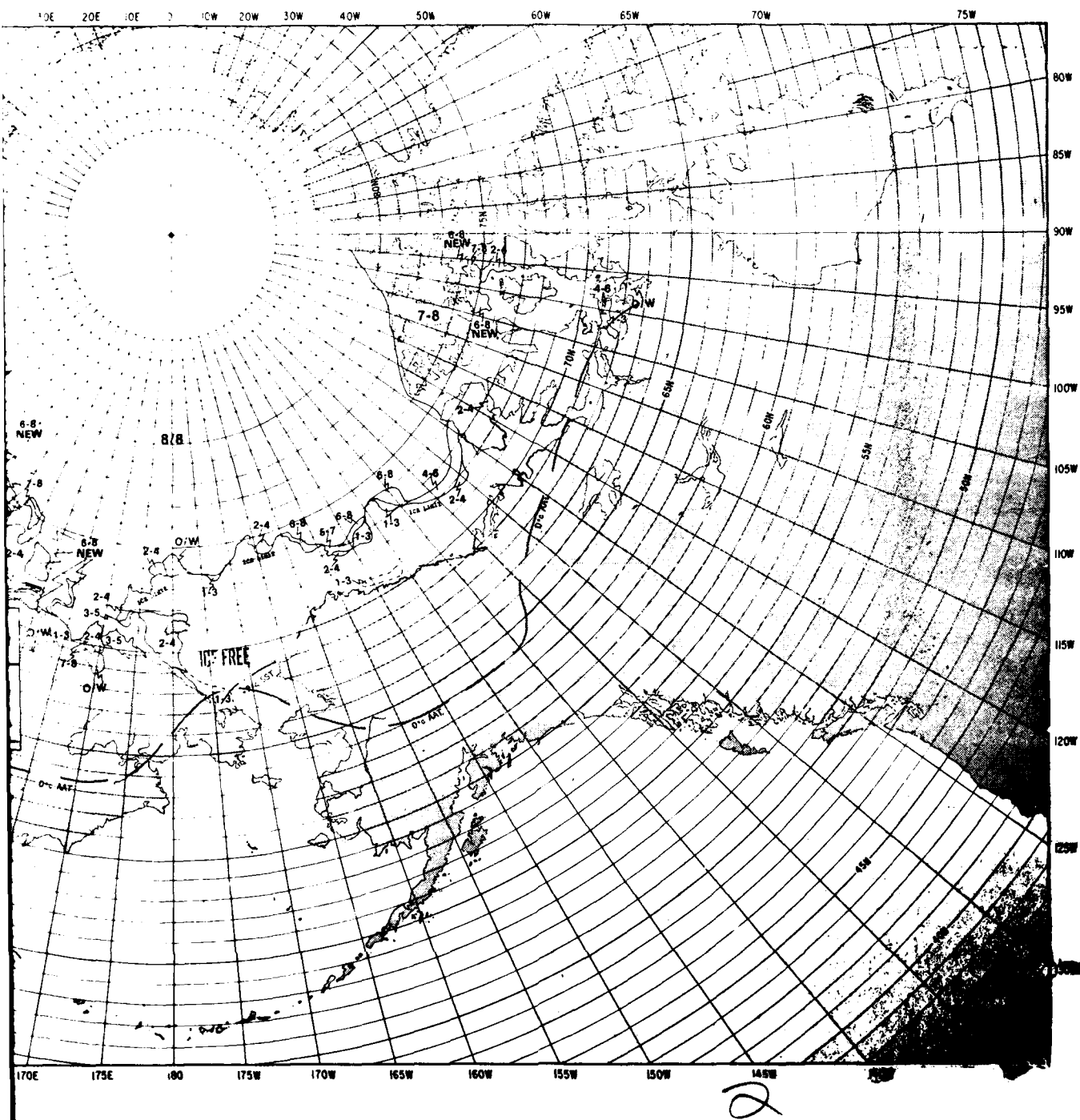


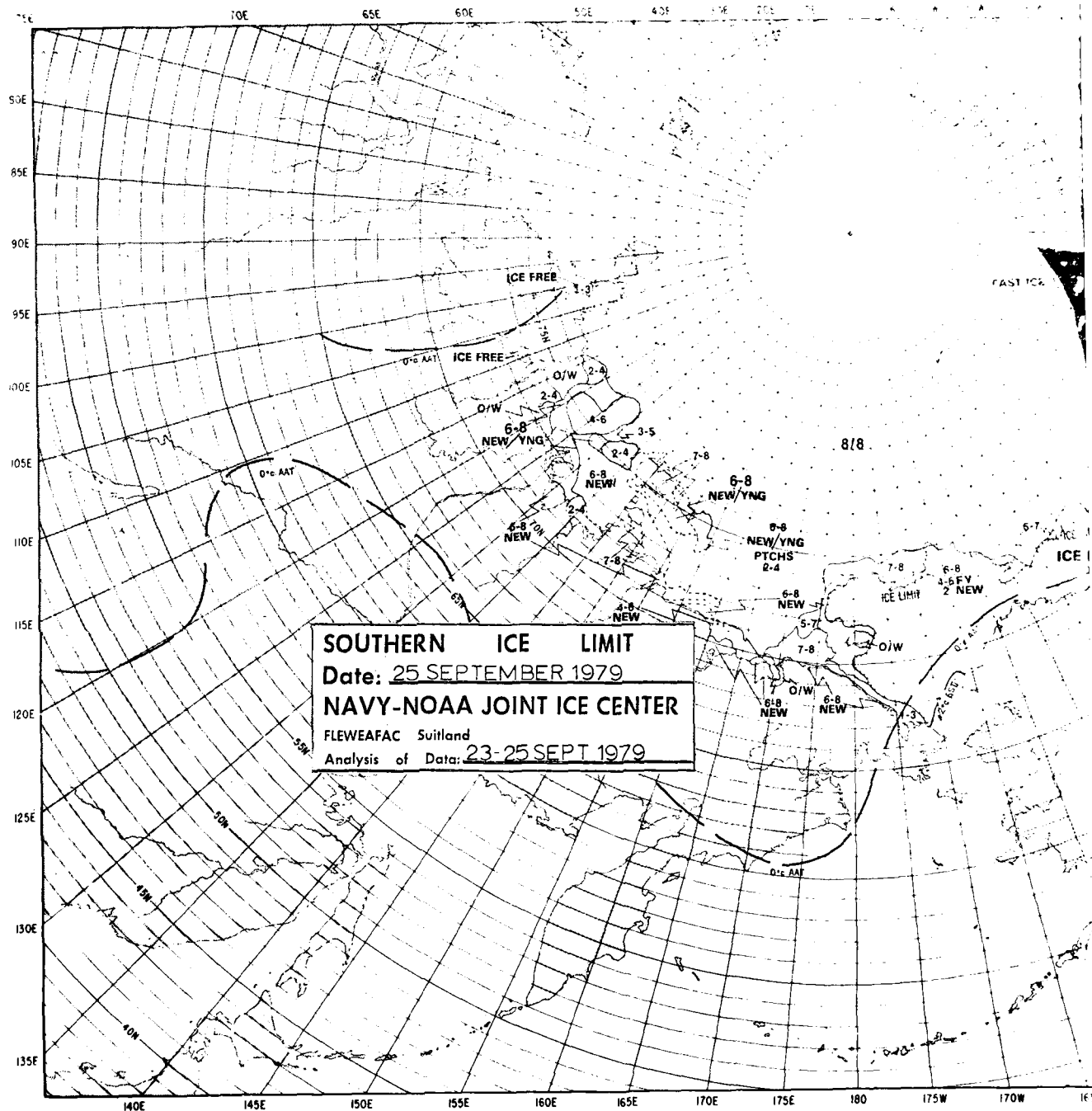
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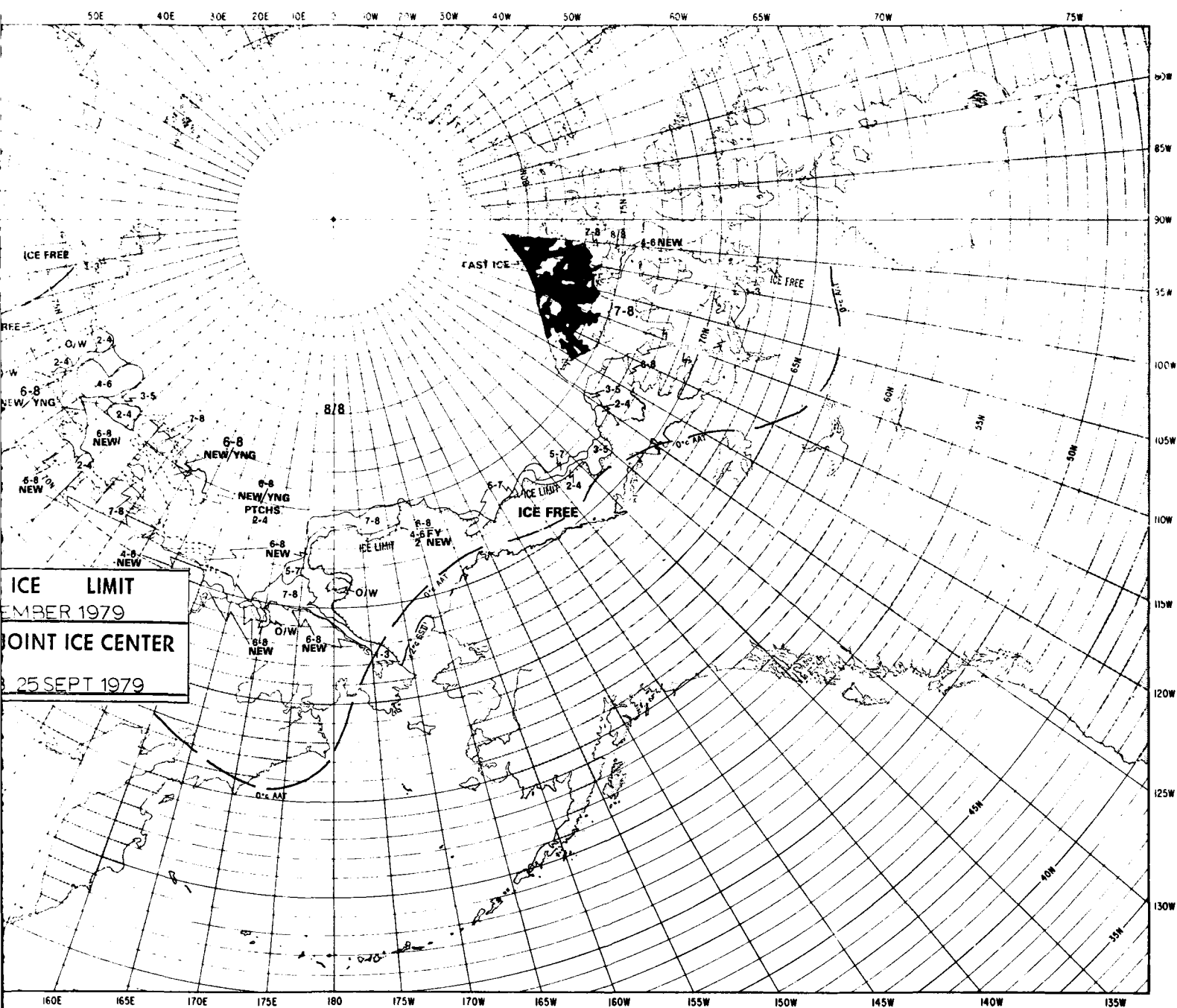


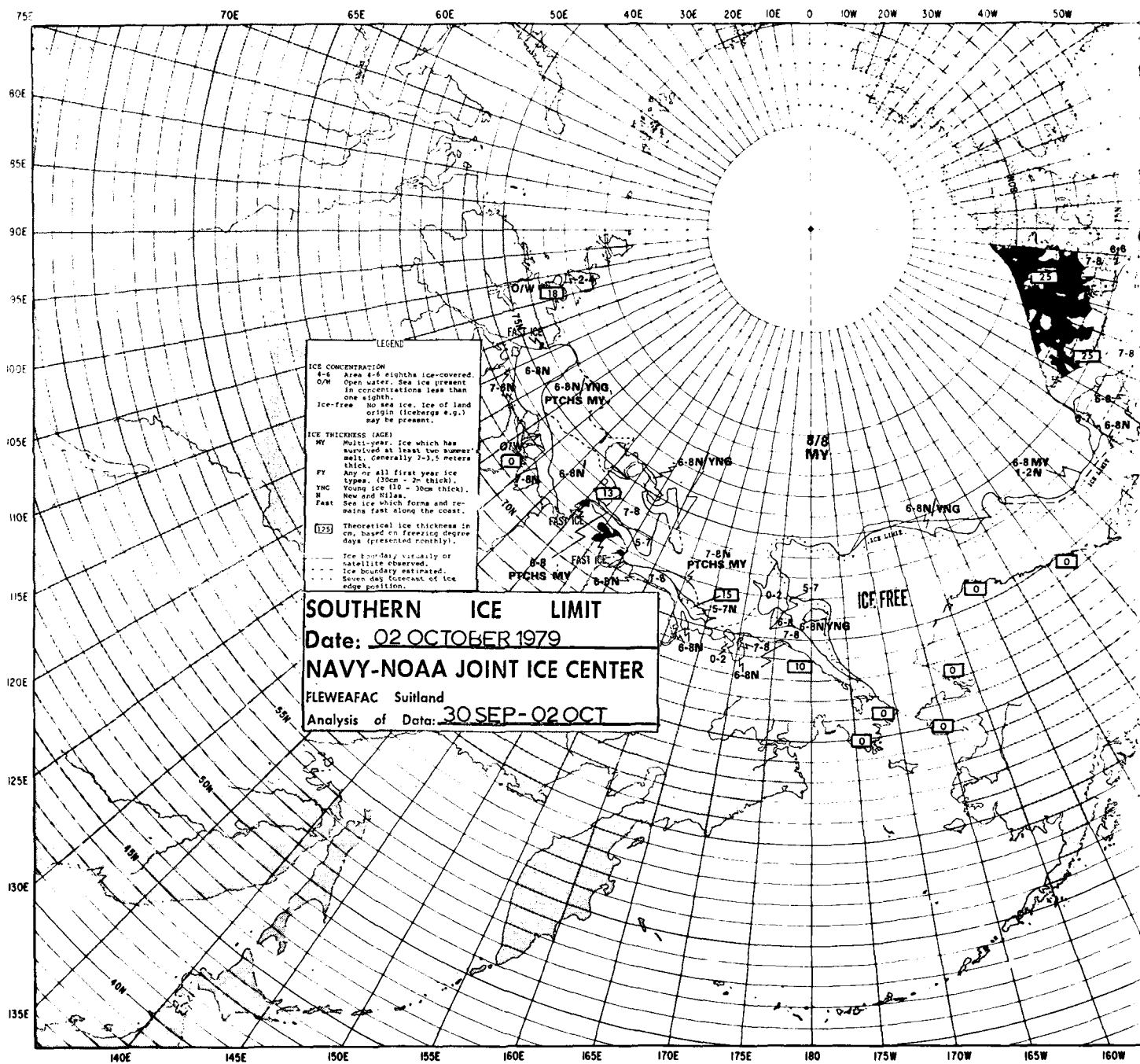












LEGEND

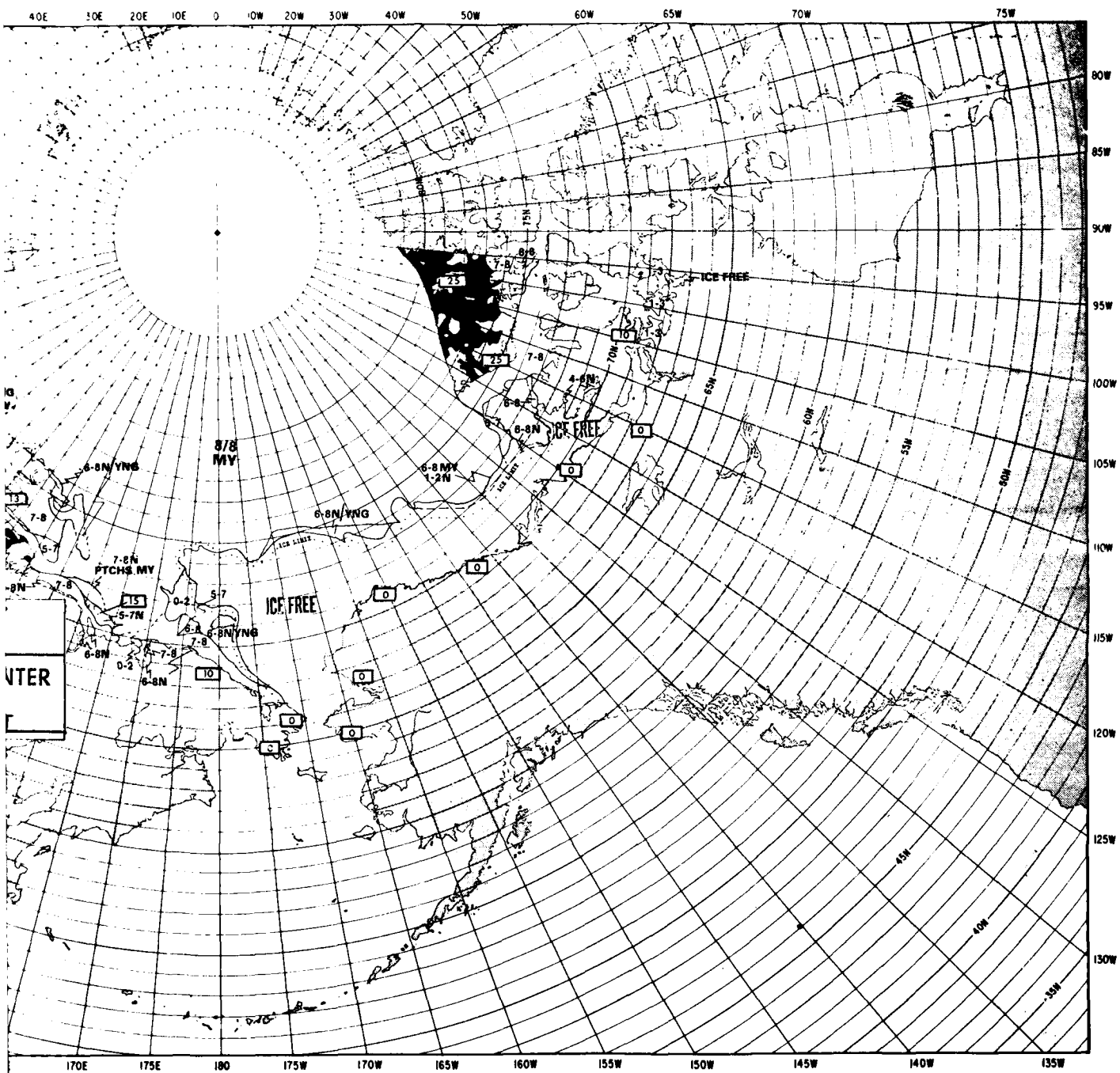
ICE CONCENTRATION
 0/8 Area 1/8 eighth the ice-covered.
 O/W Open water. Sea ice present
 in concentrations less than
 one eighth.
 Ice-free No sea ice. Ice of land
 origin (icebergs &c.)
 may be present.

ICE THICKNESS (AGE)
 MY Multi-year. Ice which has
 survived at least two summer
 melt. Generally 2-3.5 meters
 thick.
 FY Any or all first year ice
 types. (10cm - 2m thick).
 YNG Young ice (10 - 30cm thick).
 N New and Nilas.
 Fast Sea ice which forms and re-
 mains fast along the coast.

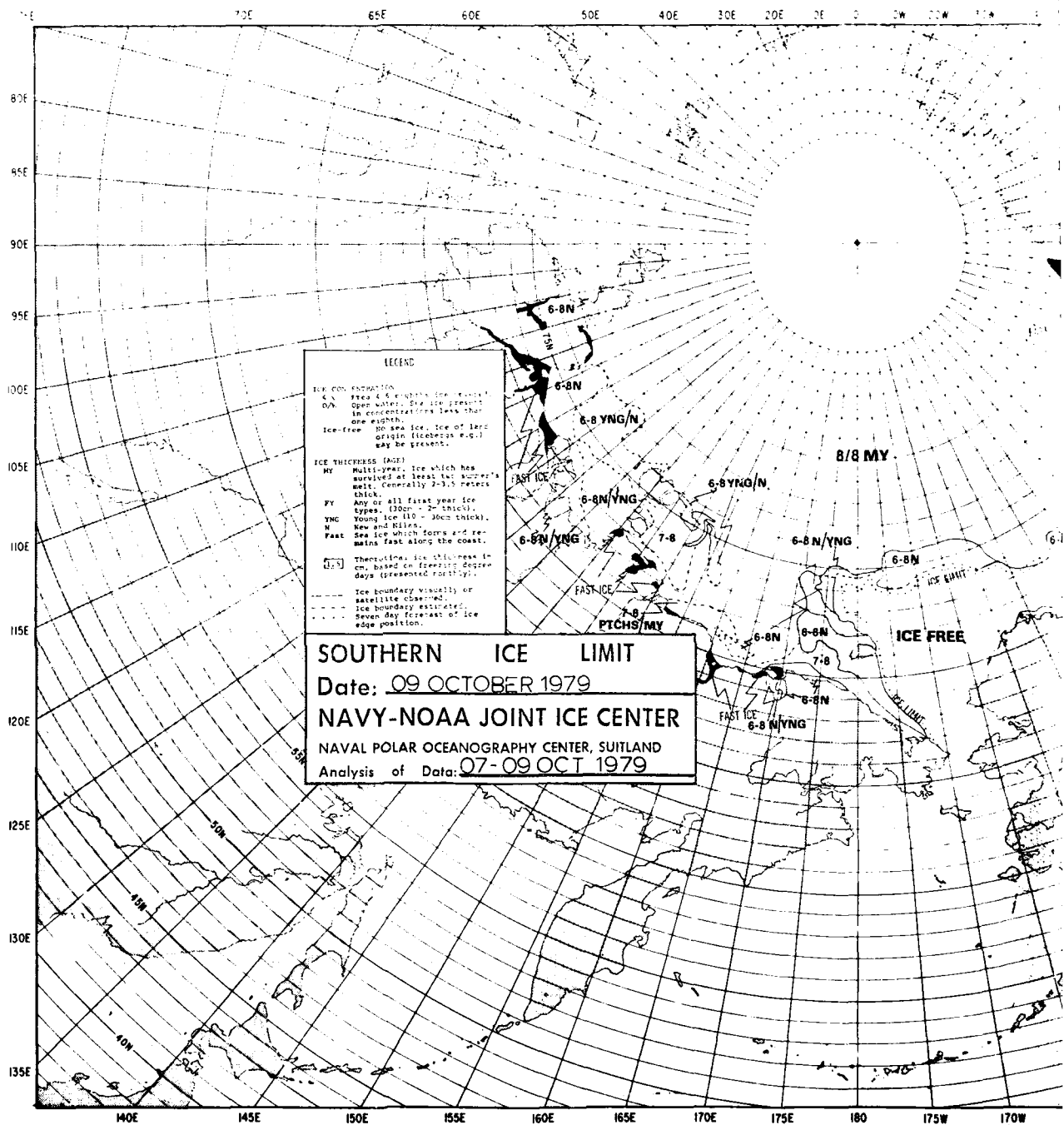
129 Theoretical ice thickness in
 cm, based on freezing degree
 days (presented monthly).

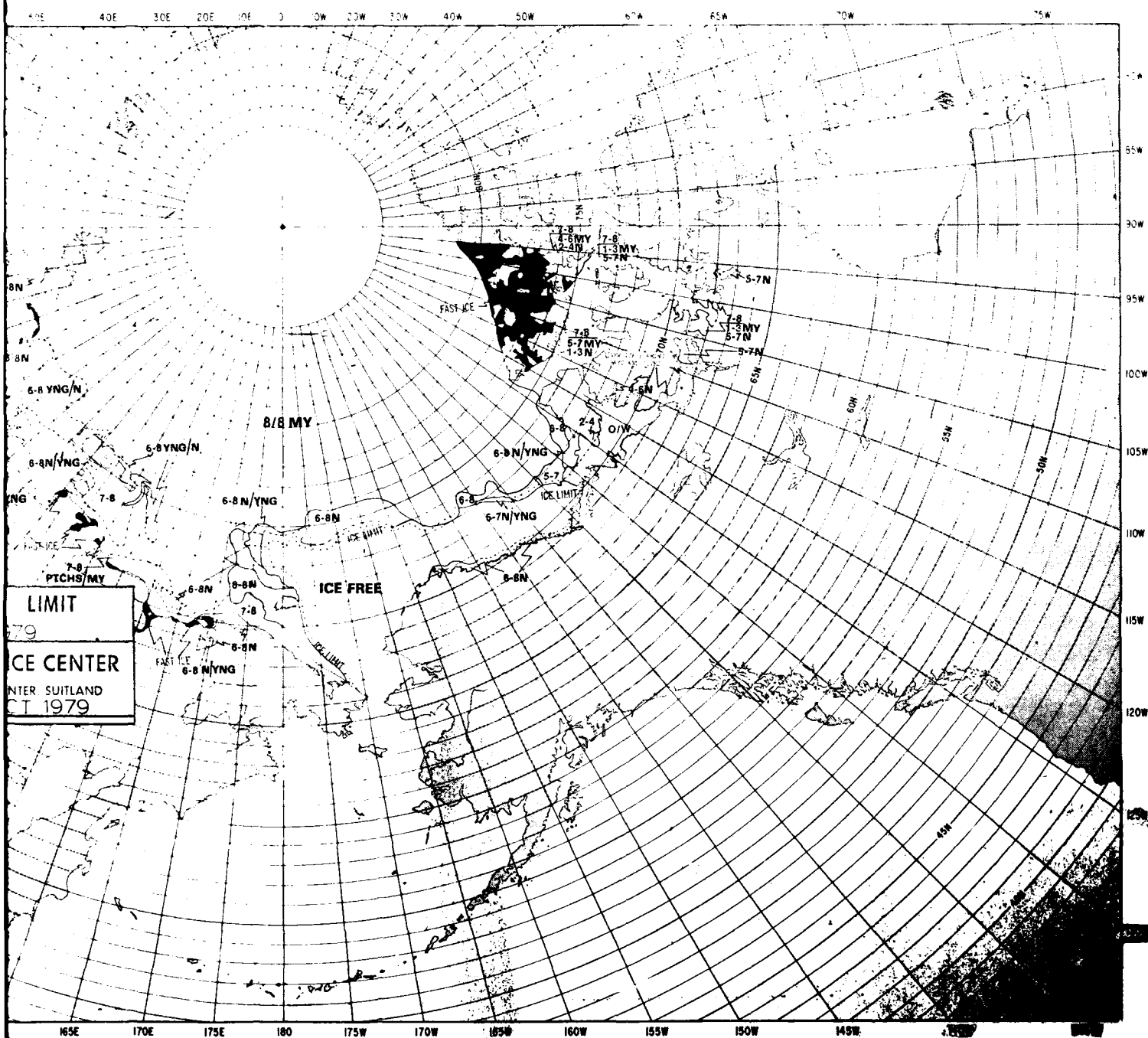
--- Ice boundary visually or
 satellite observed.
 --- Ice boundary estimated.
 --- Seven day forecast of ice
 edge position.

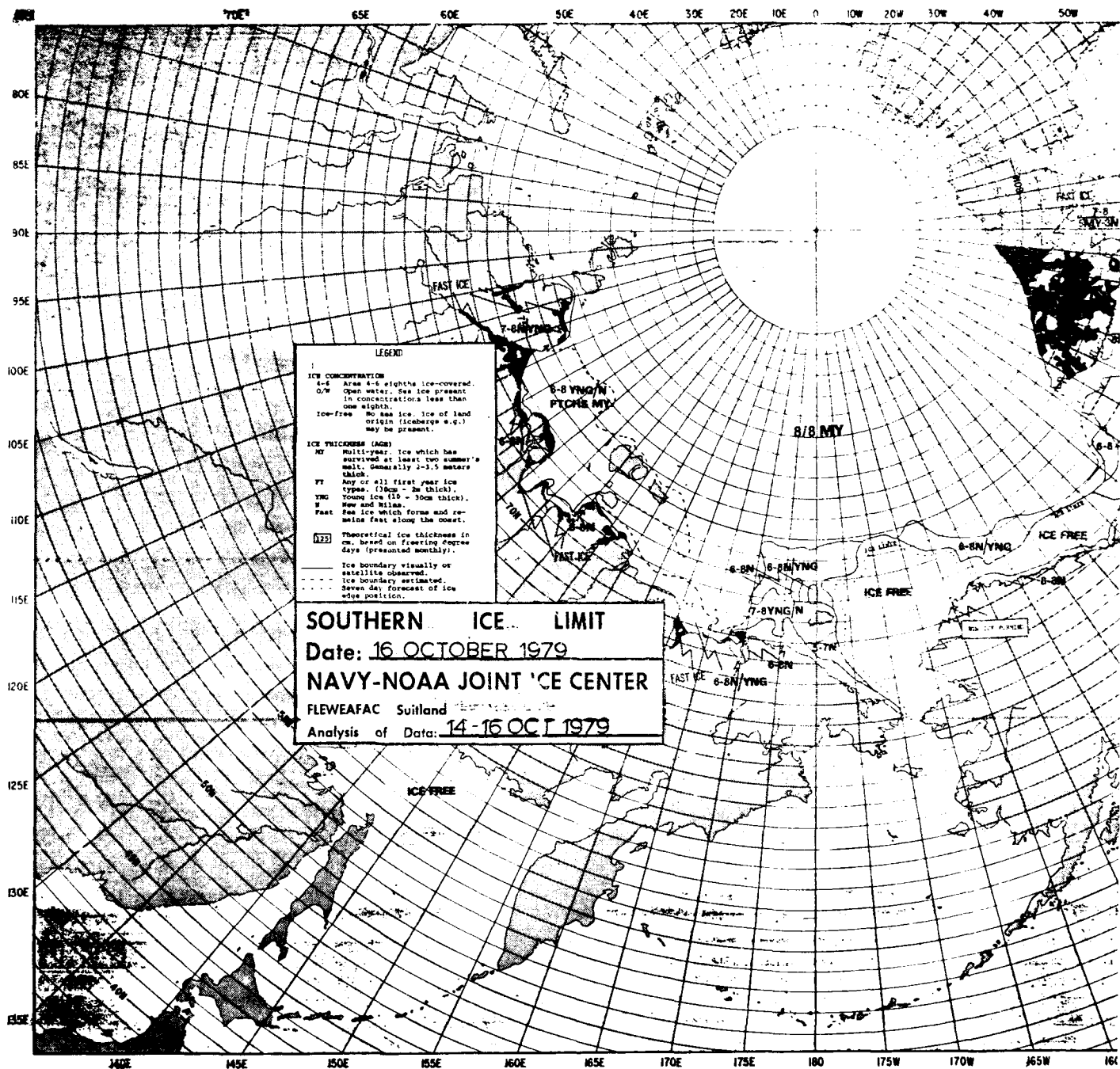
SOUTHERN ICE LIMIT
Date: 02 OCTOBER 1979
NAVY-NOAA JOINT ICE CENTER
FLEWEAFAC Suitland
Analysis of Data: 30 SEP-02 OCT

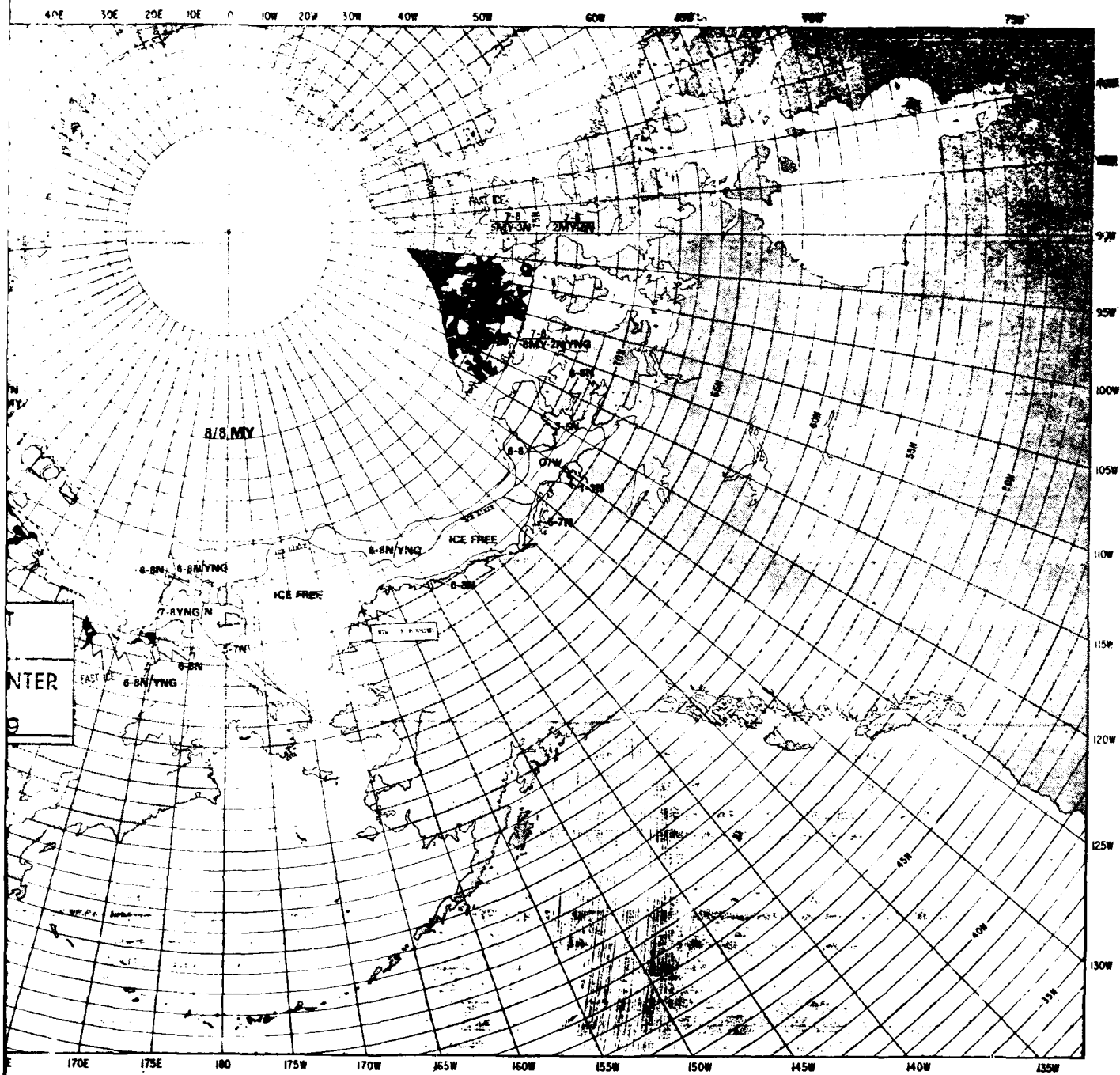


2









INTER

15

AD-A086 375 NAVAL POLAR OCEANOGRAPHY CENTER WASHINGTON DC
EASTERN-WESTERN ARCTIC SEA ICE ANALYSIS.(U)
1979

AD-A086 375 NAVAL POLAR OCEANOGRAPHY CENTER WASHINGTON DC
EASTERN-WESTERN ARCTIC SEA ICE ANALYSIS.(U)
1979

F/G 8/12

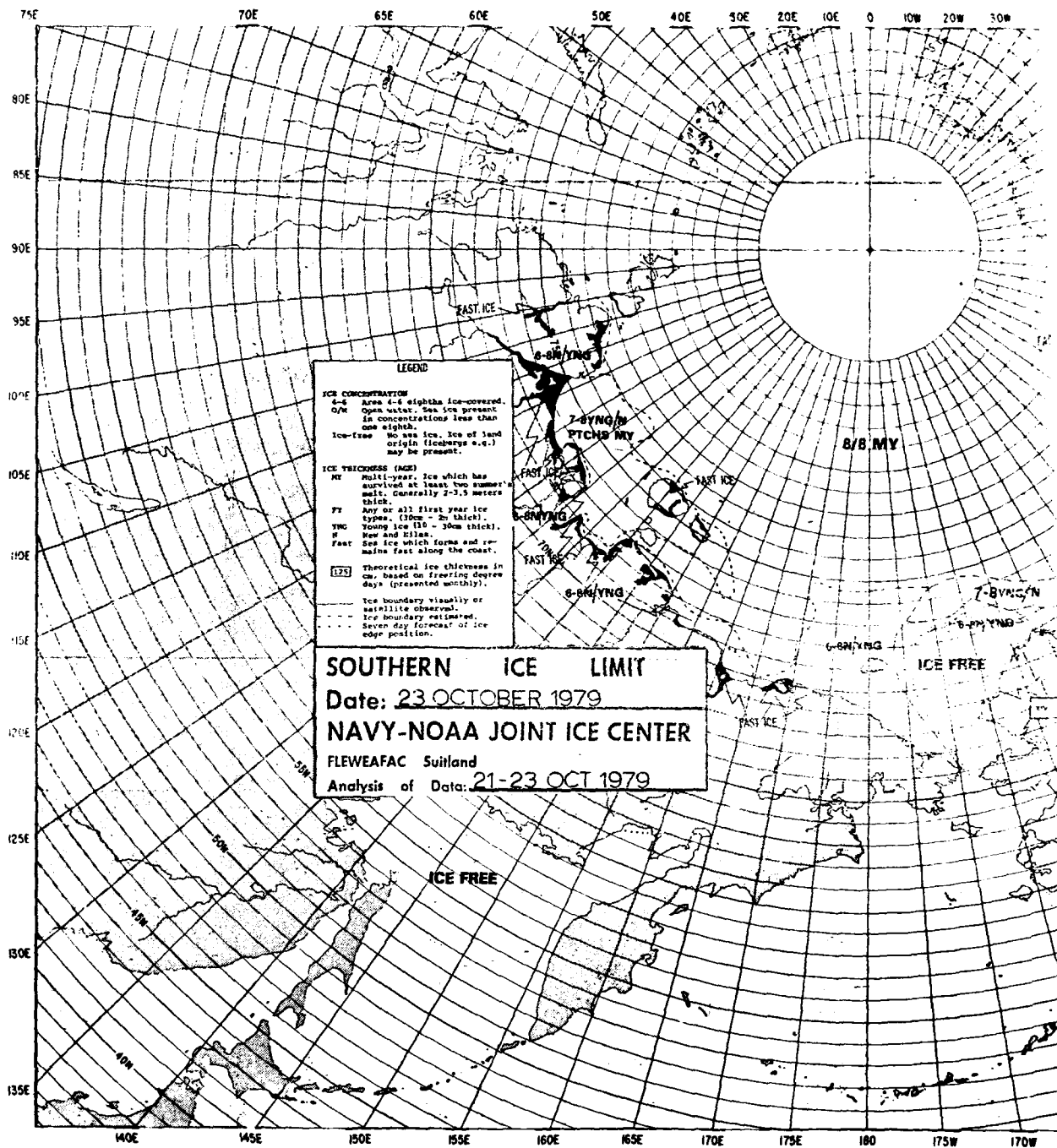
UNCLASSIFIED

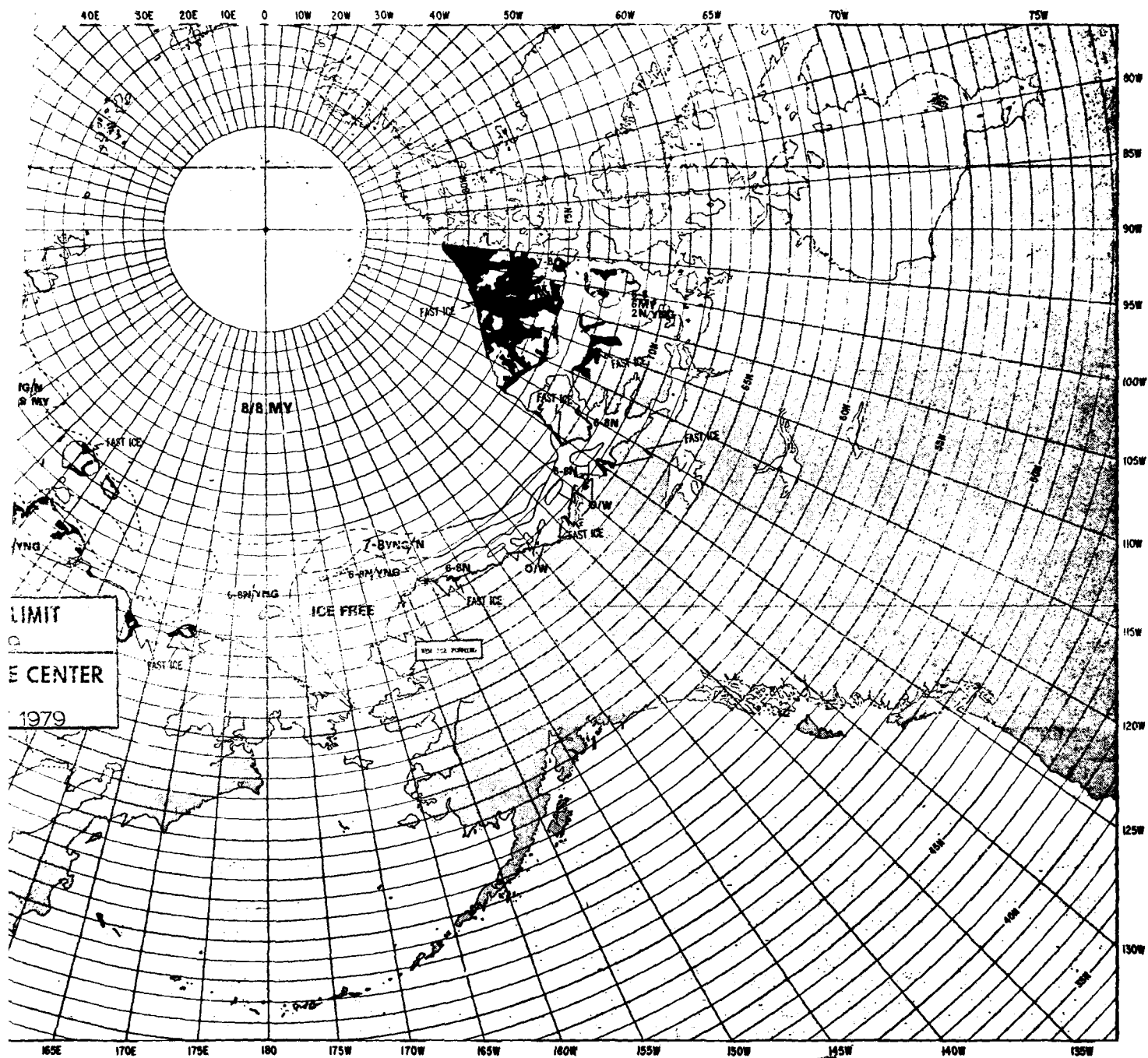
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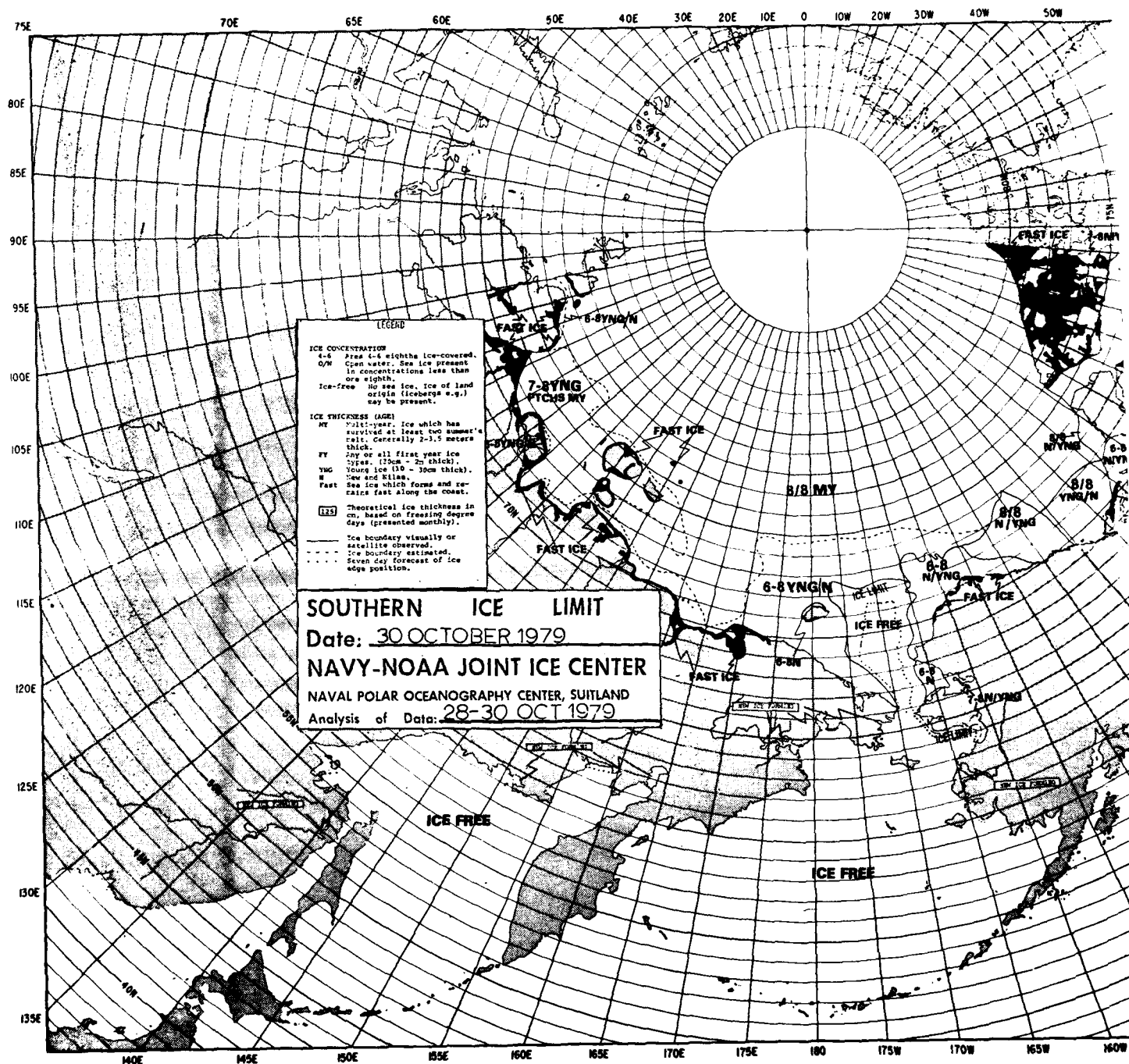
3. 3

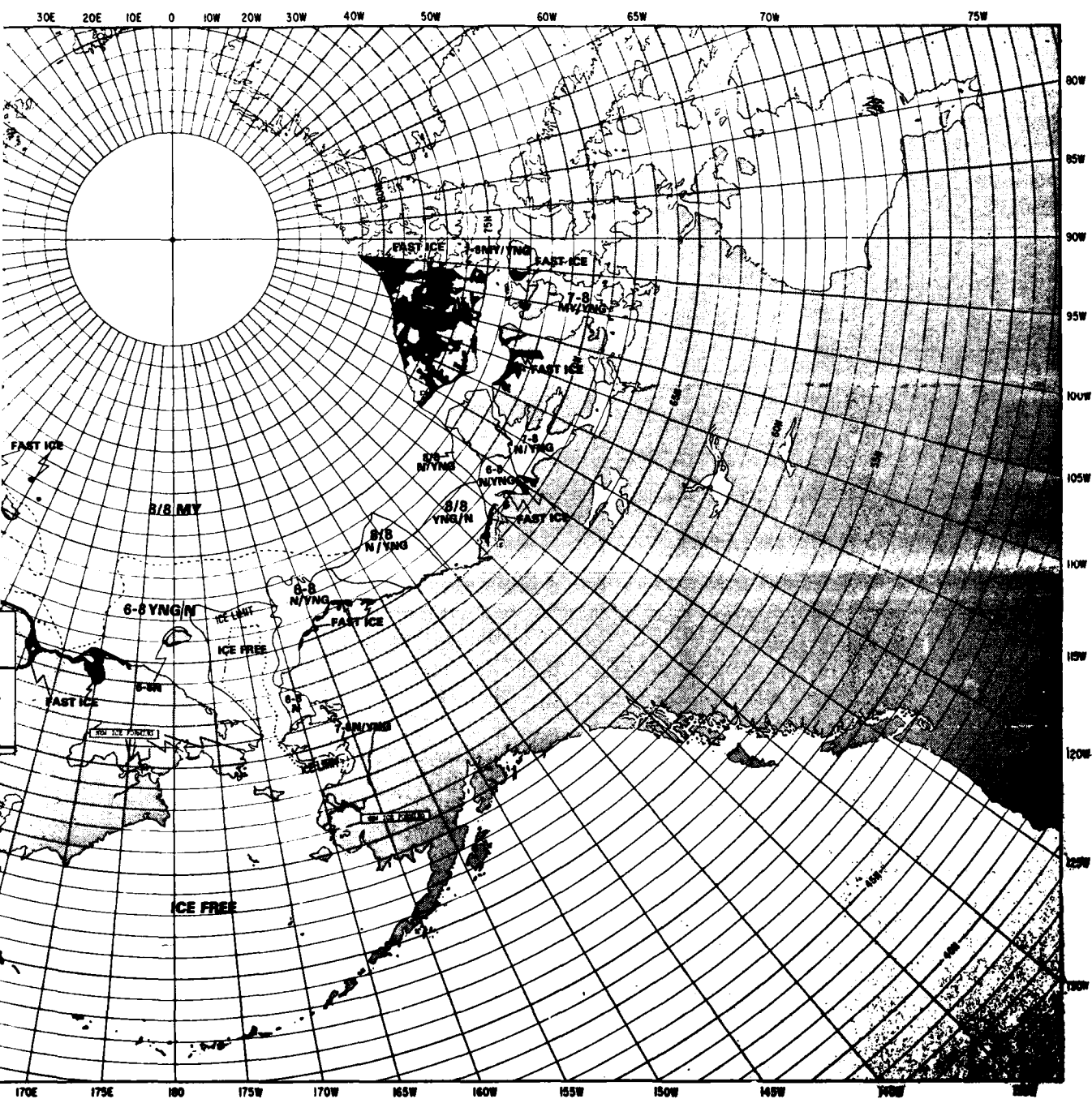
AD 37%

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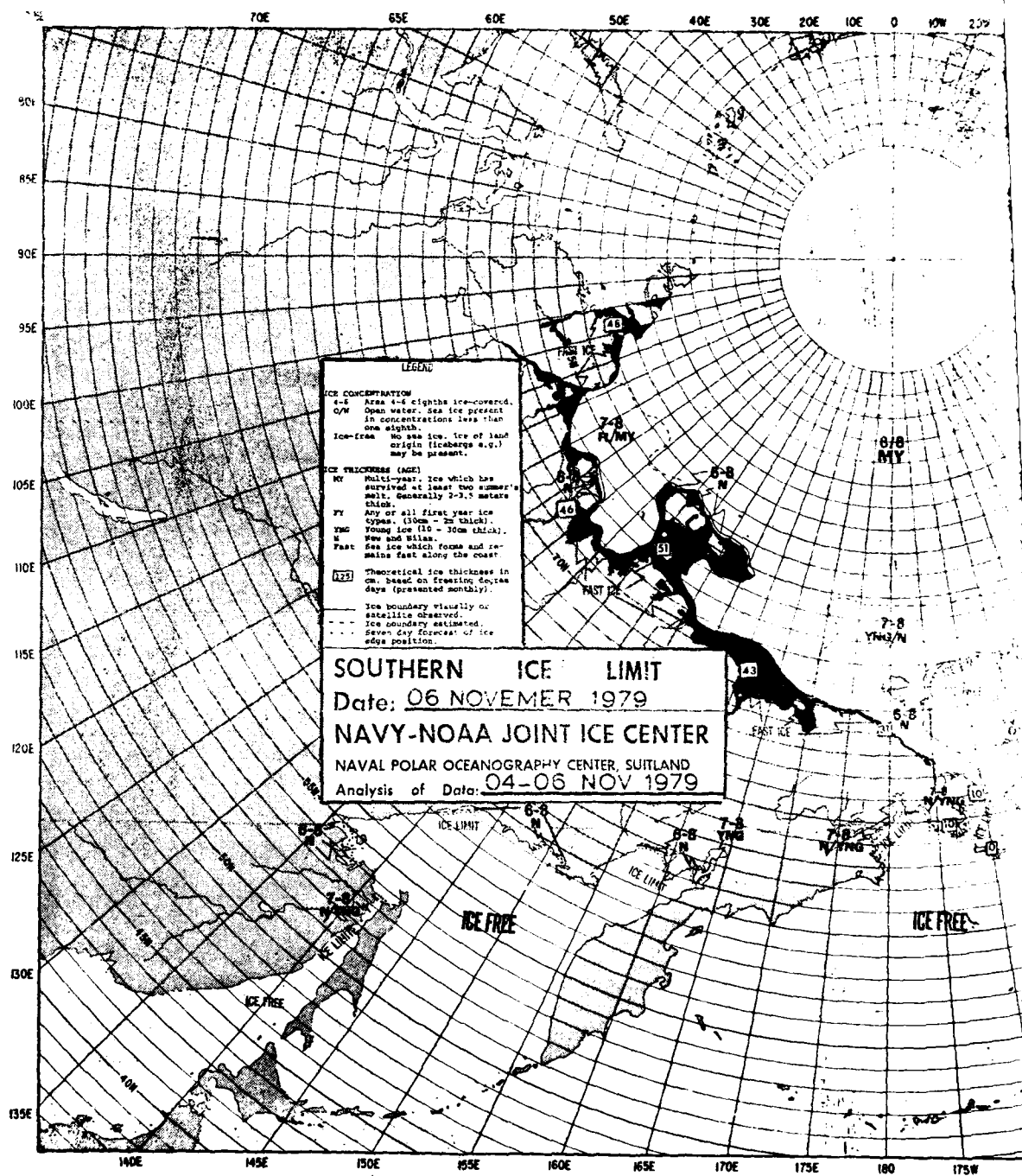


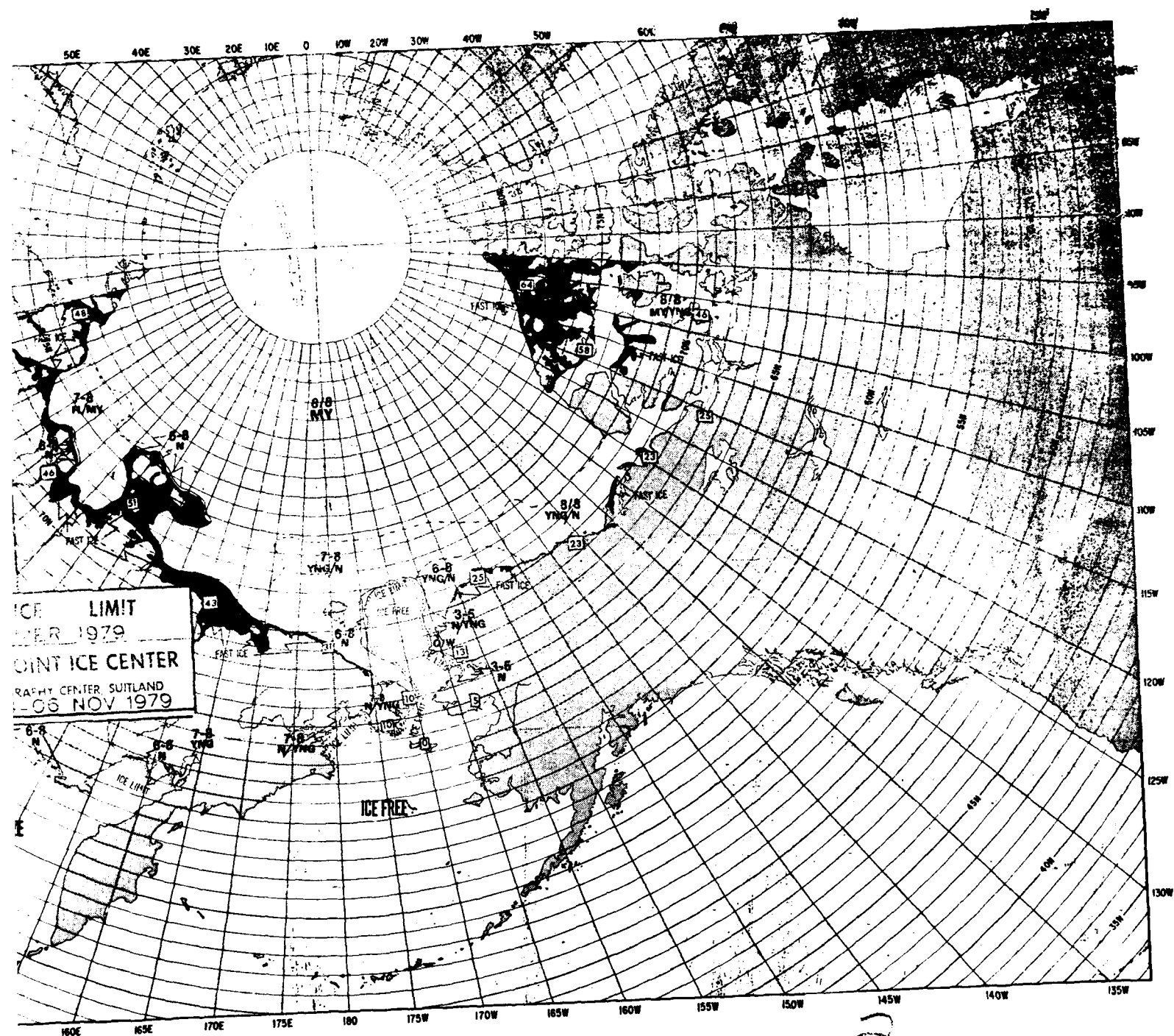


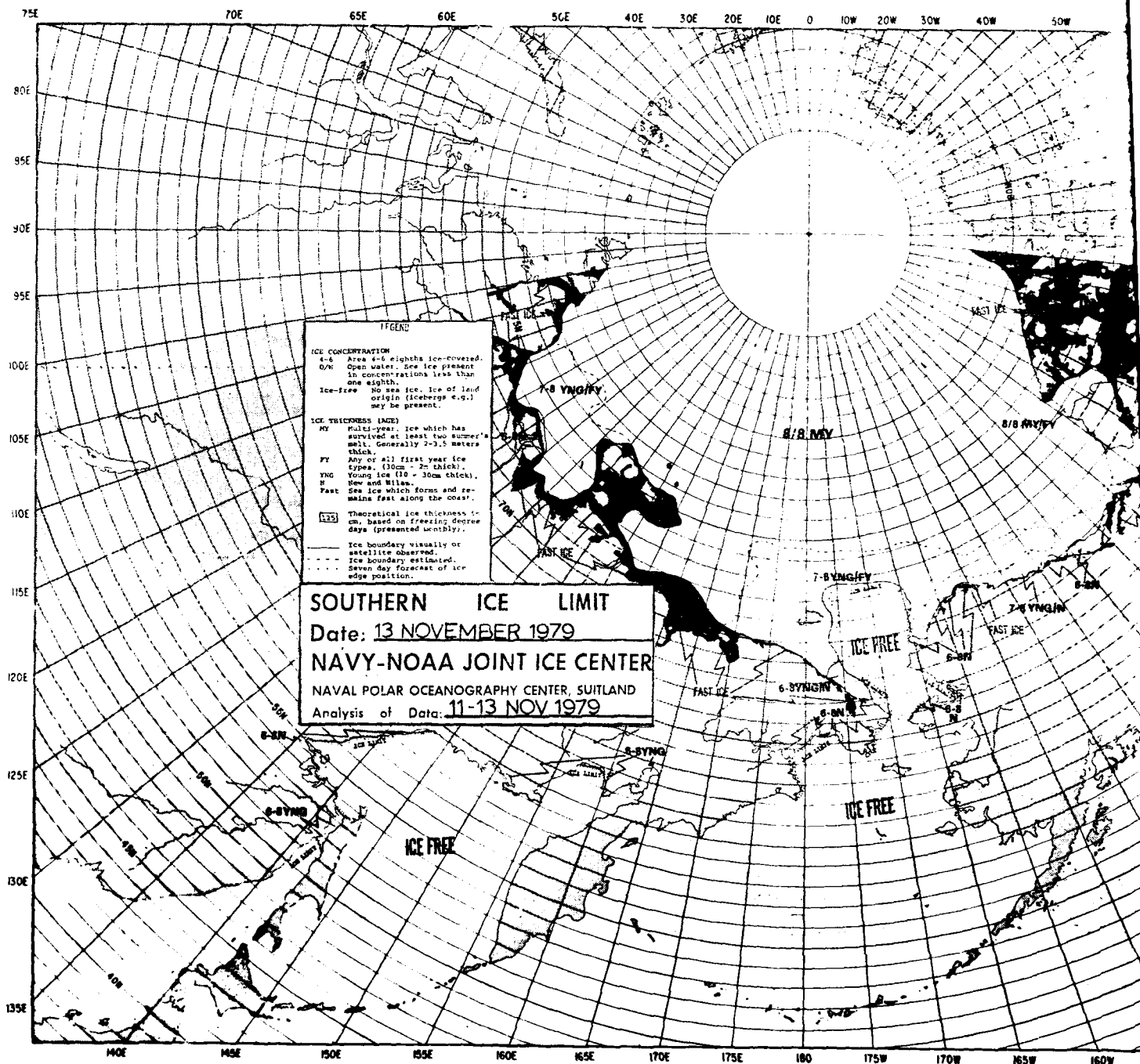


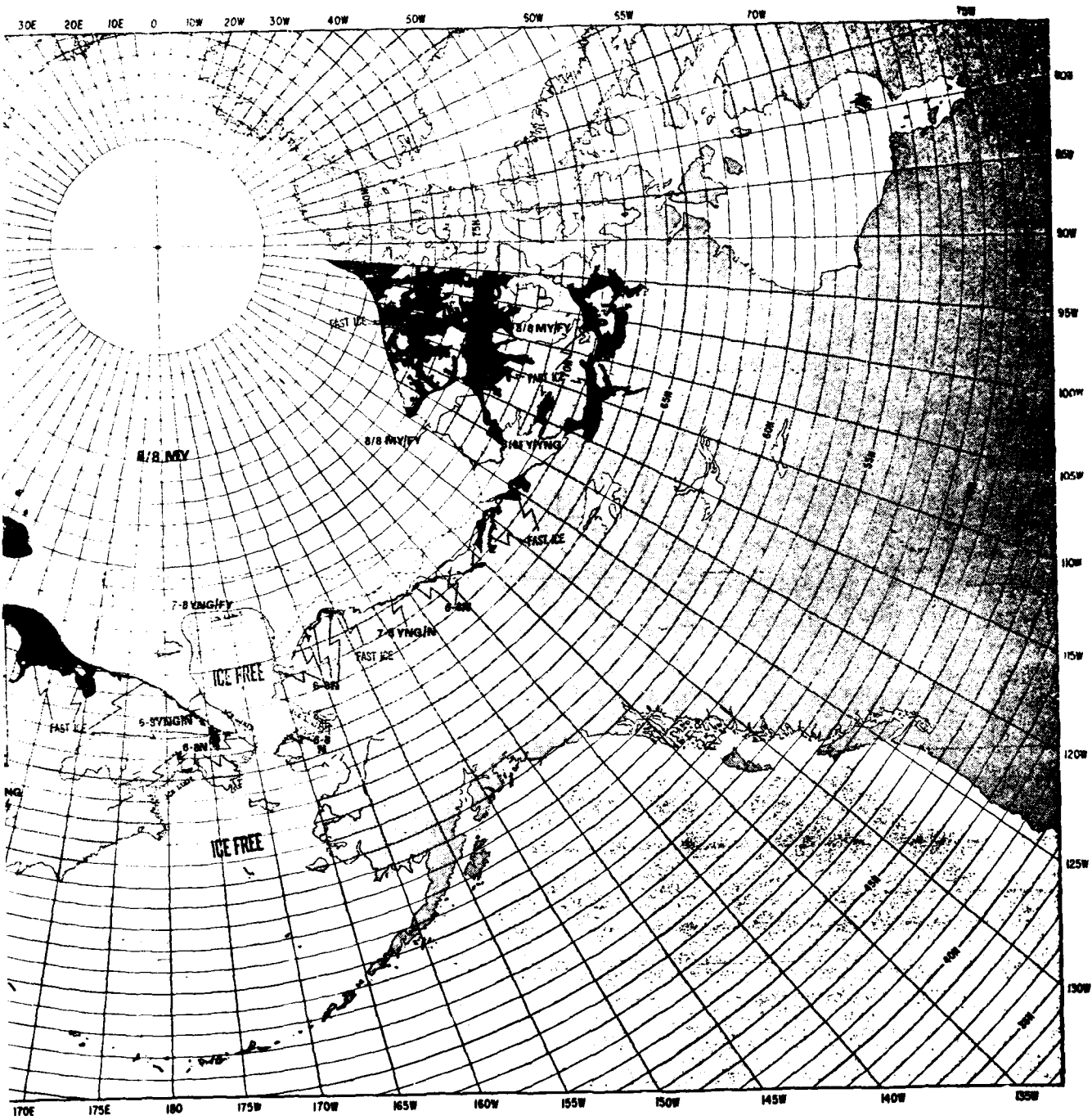


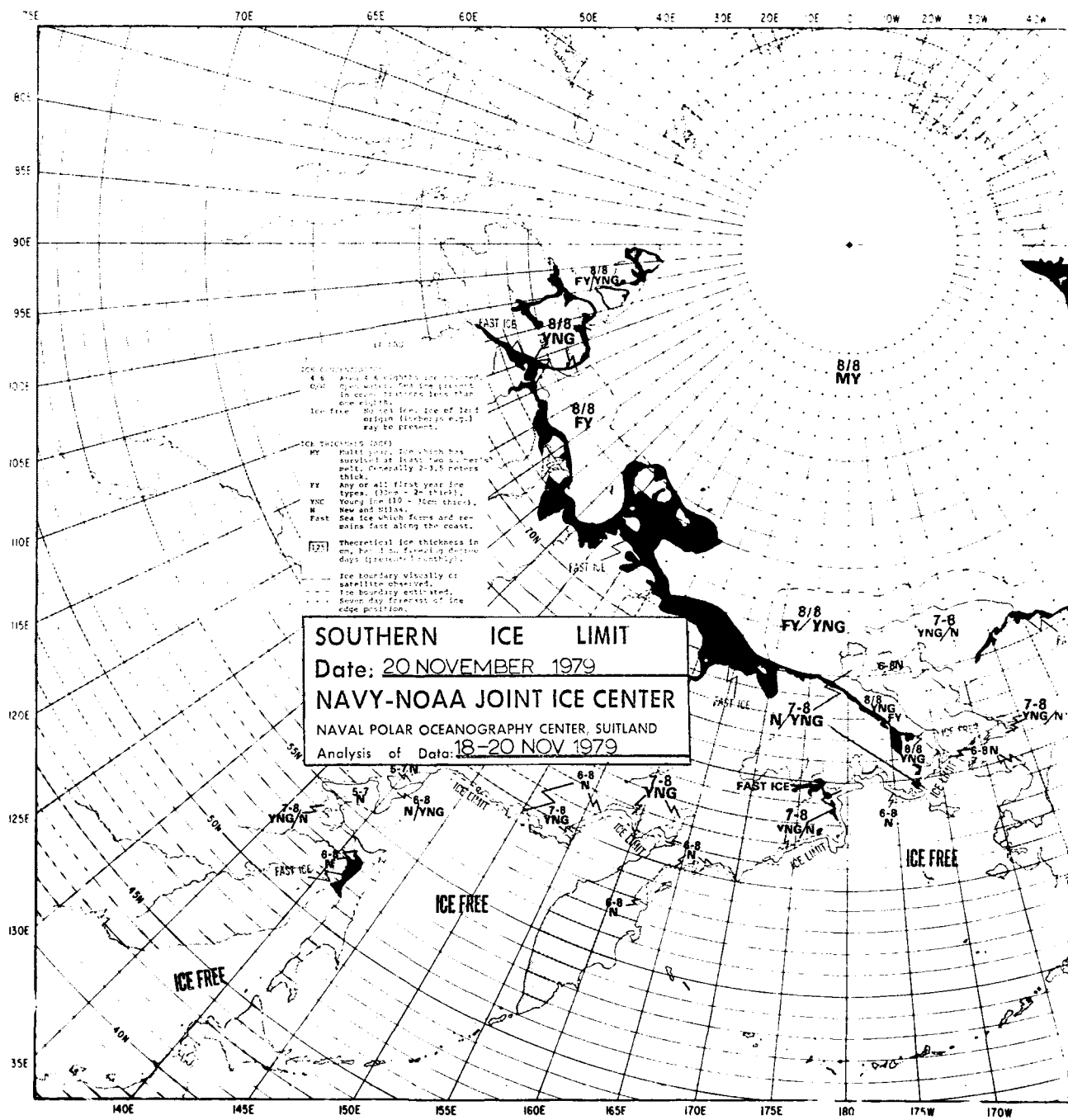
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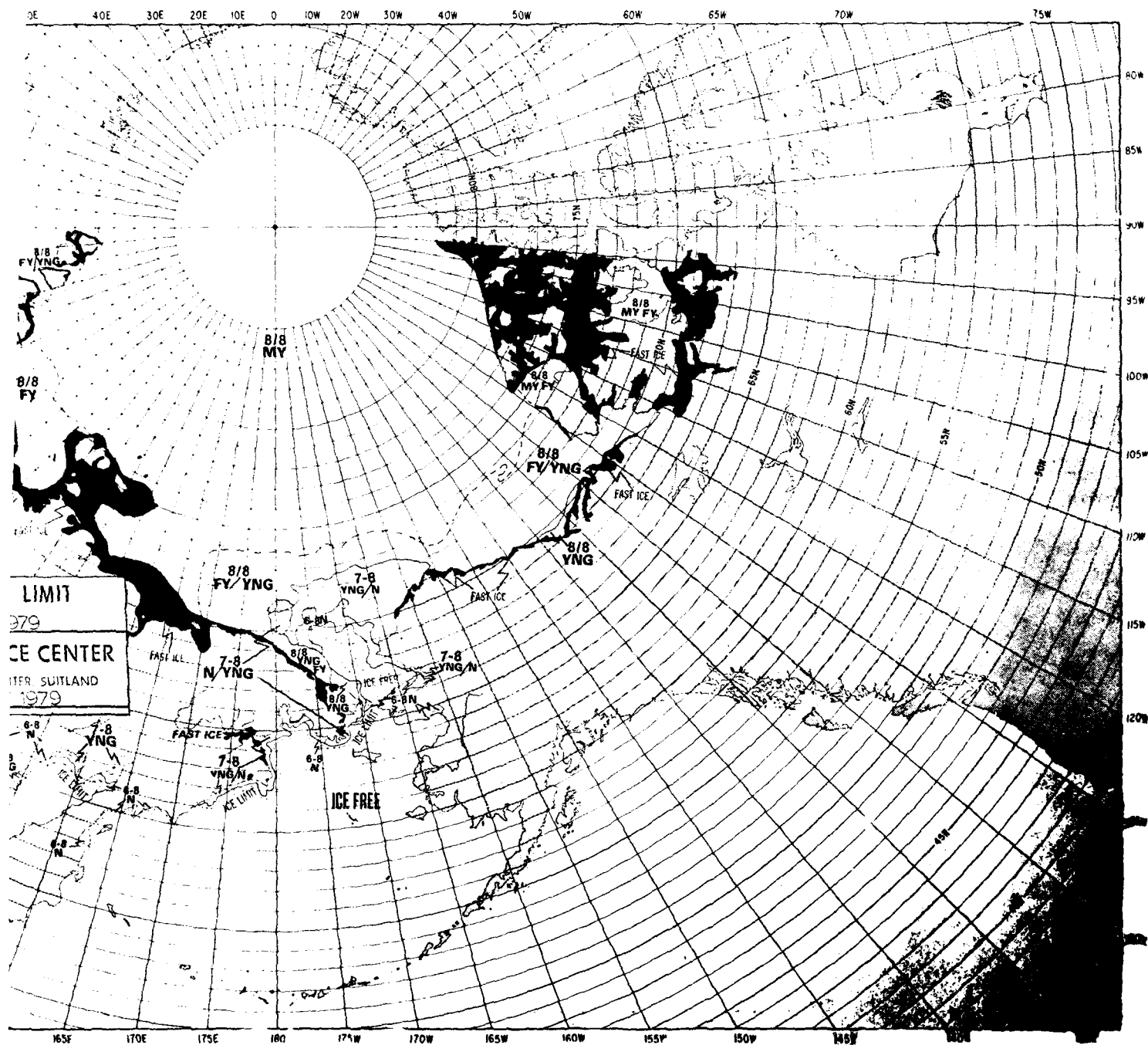


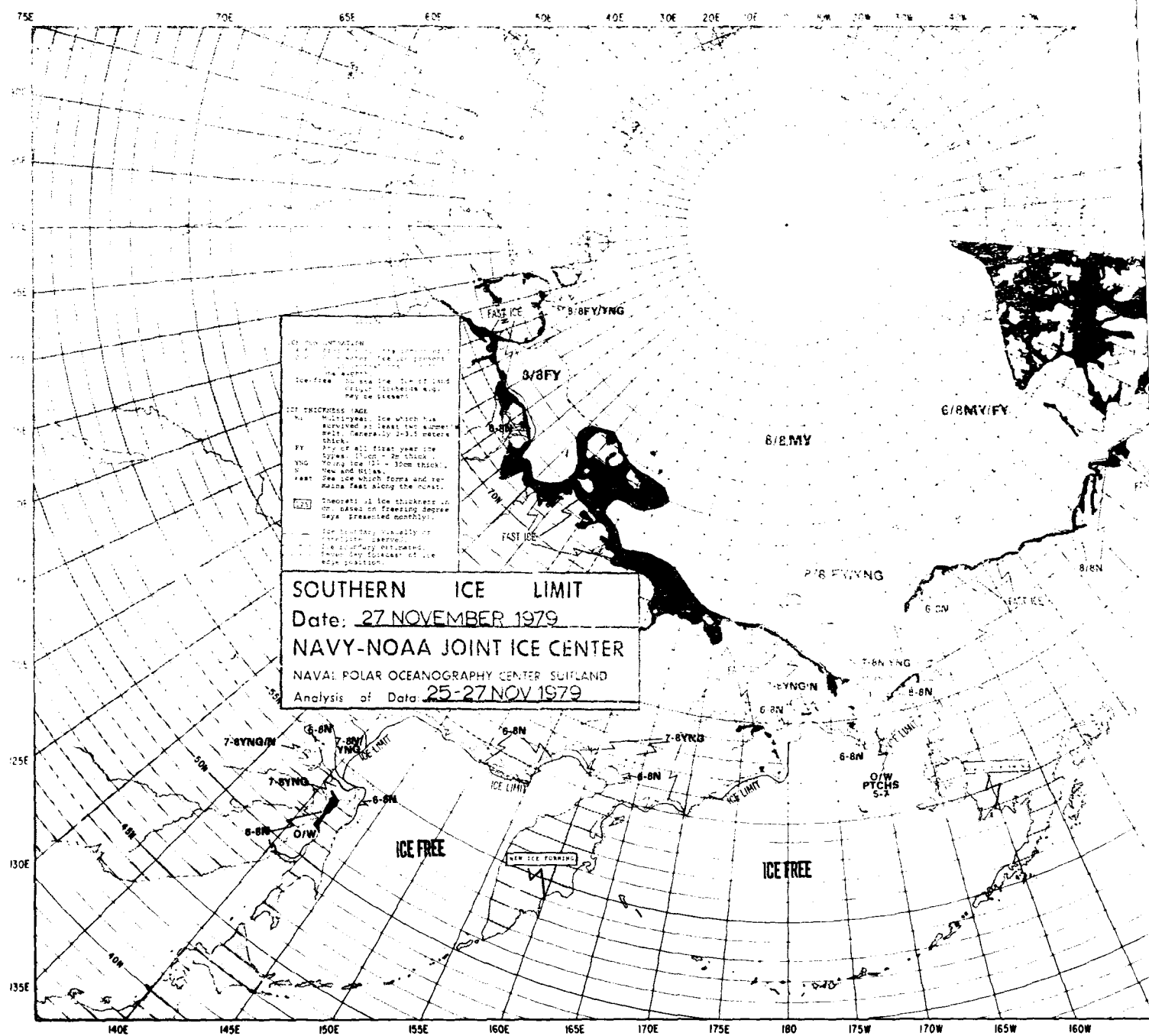


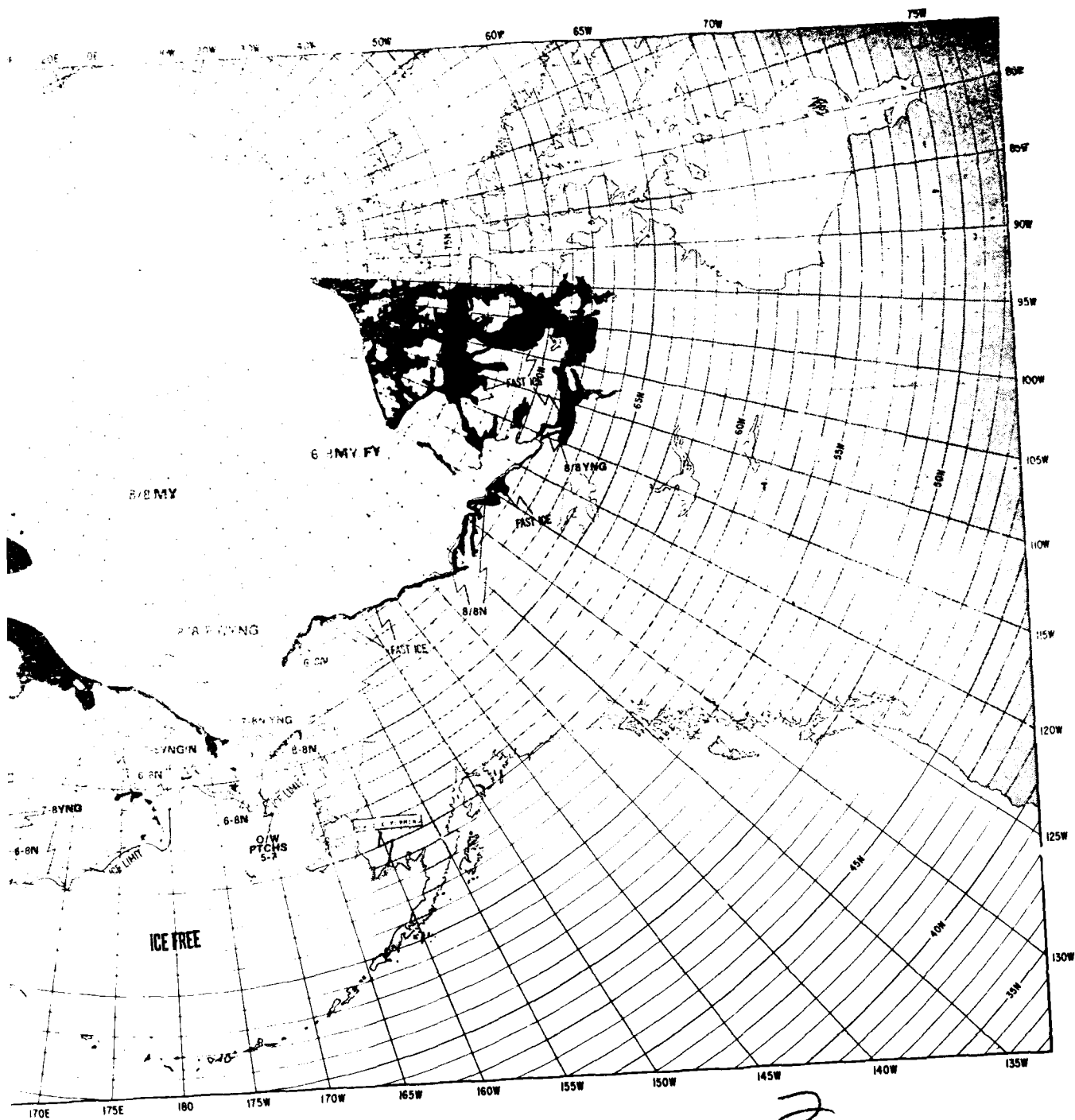


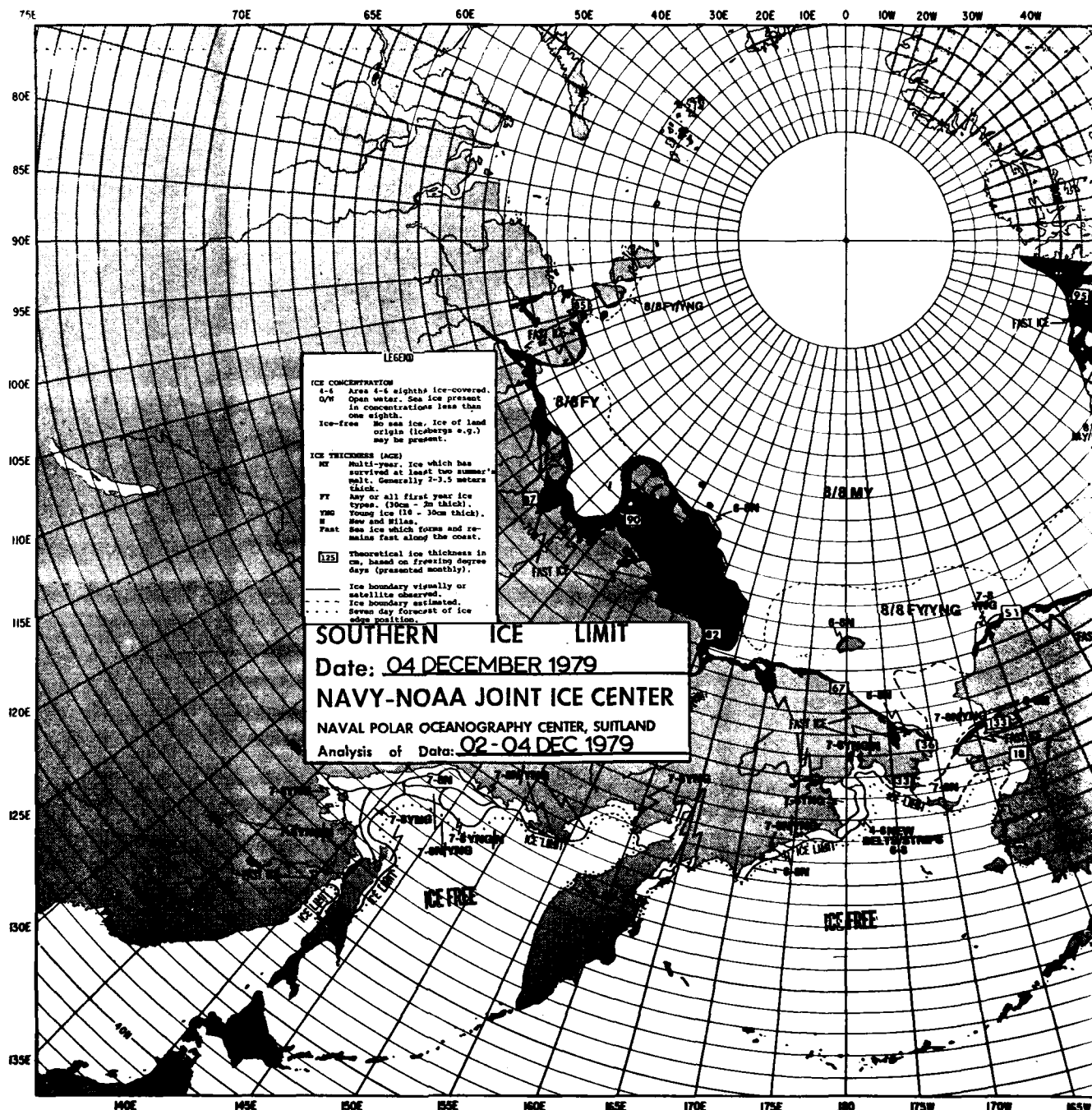


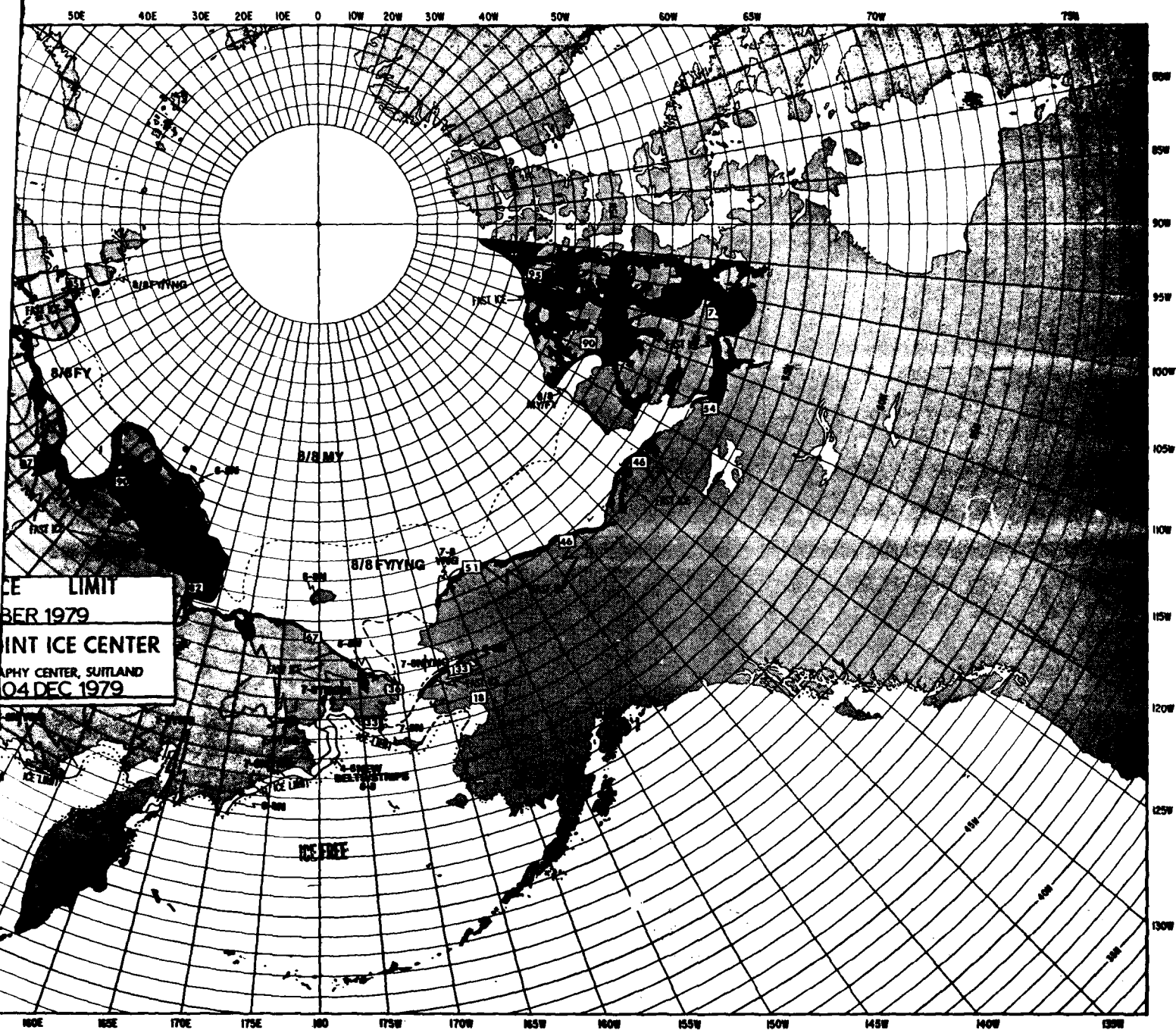


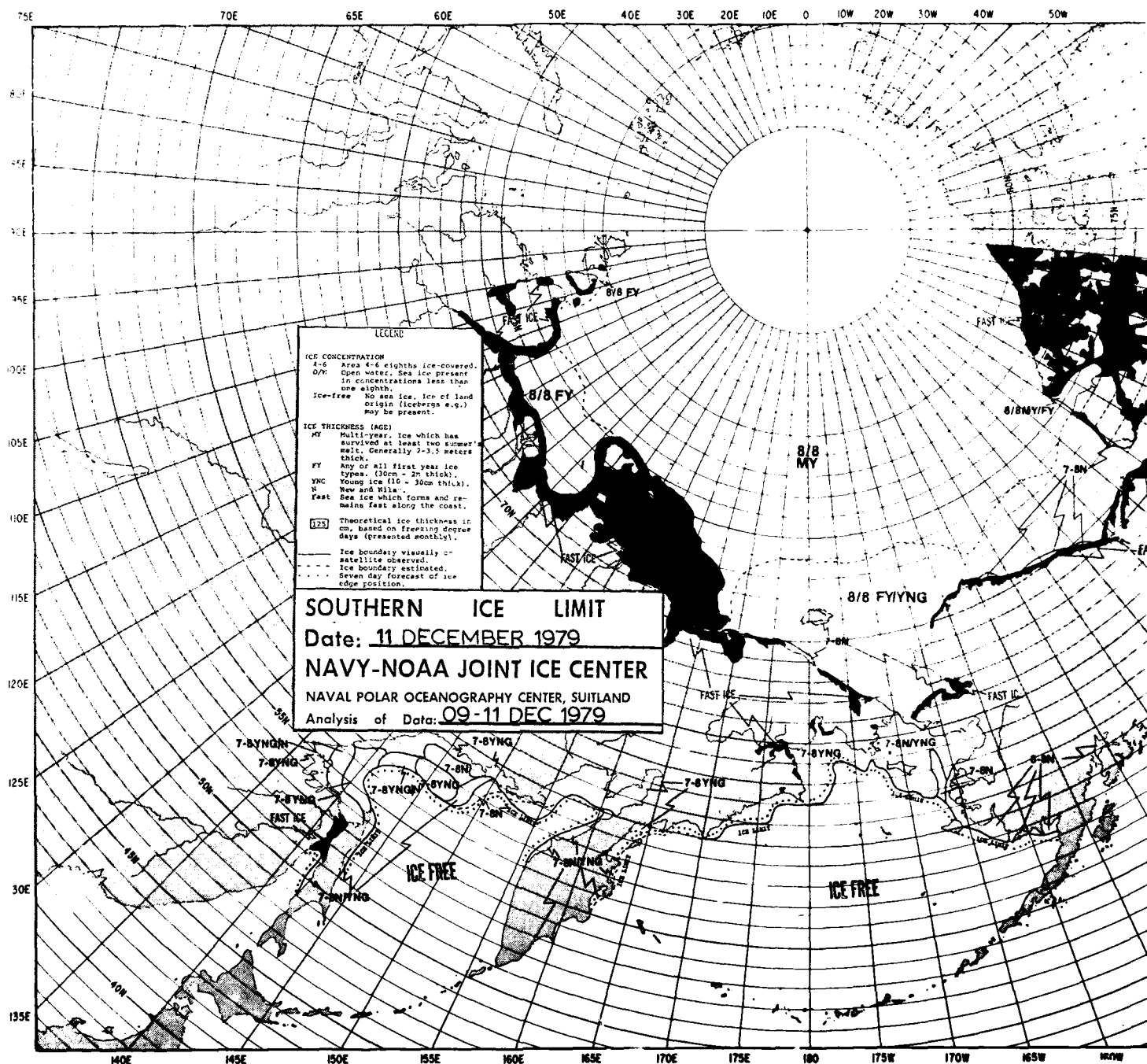


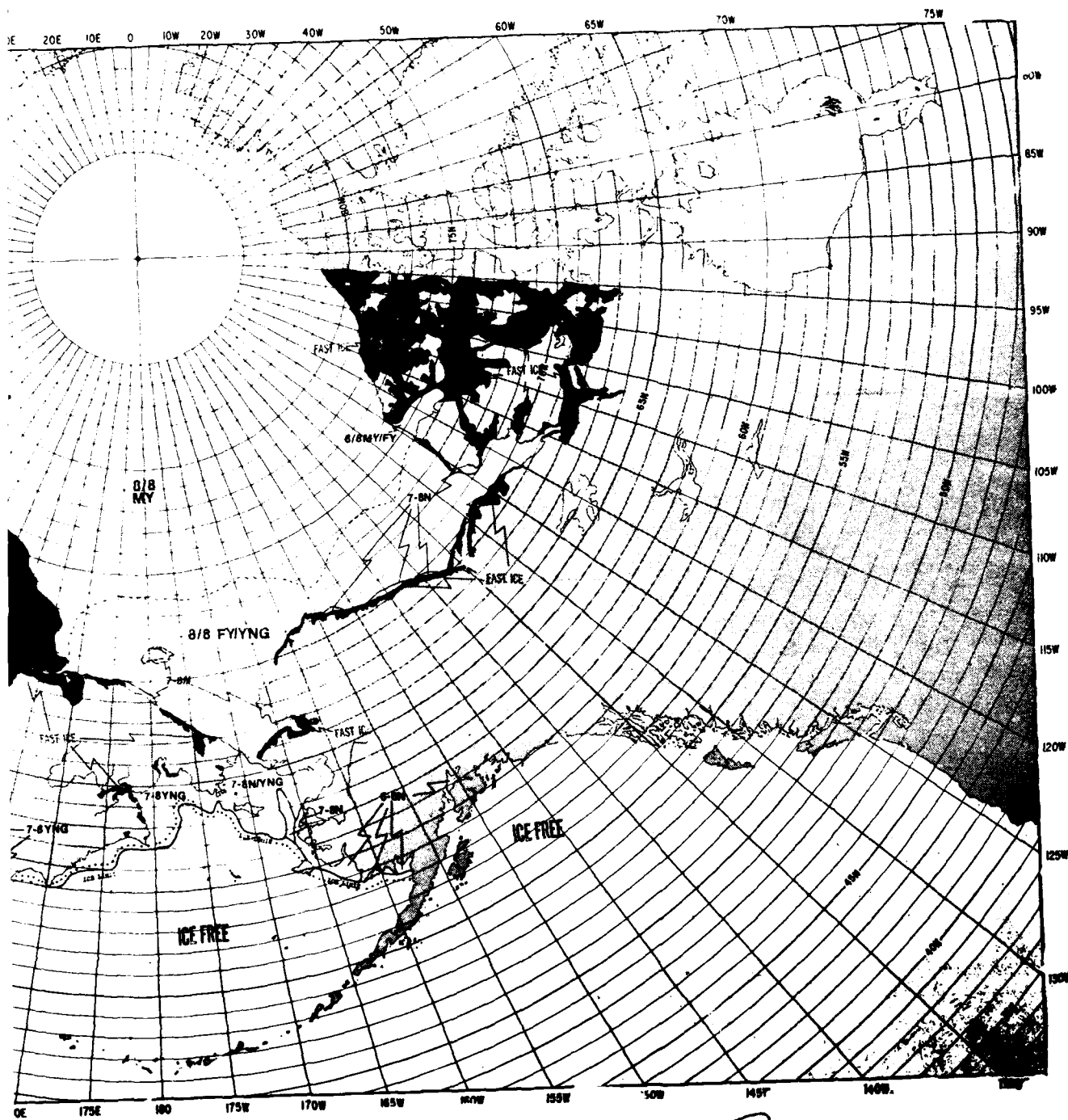


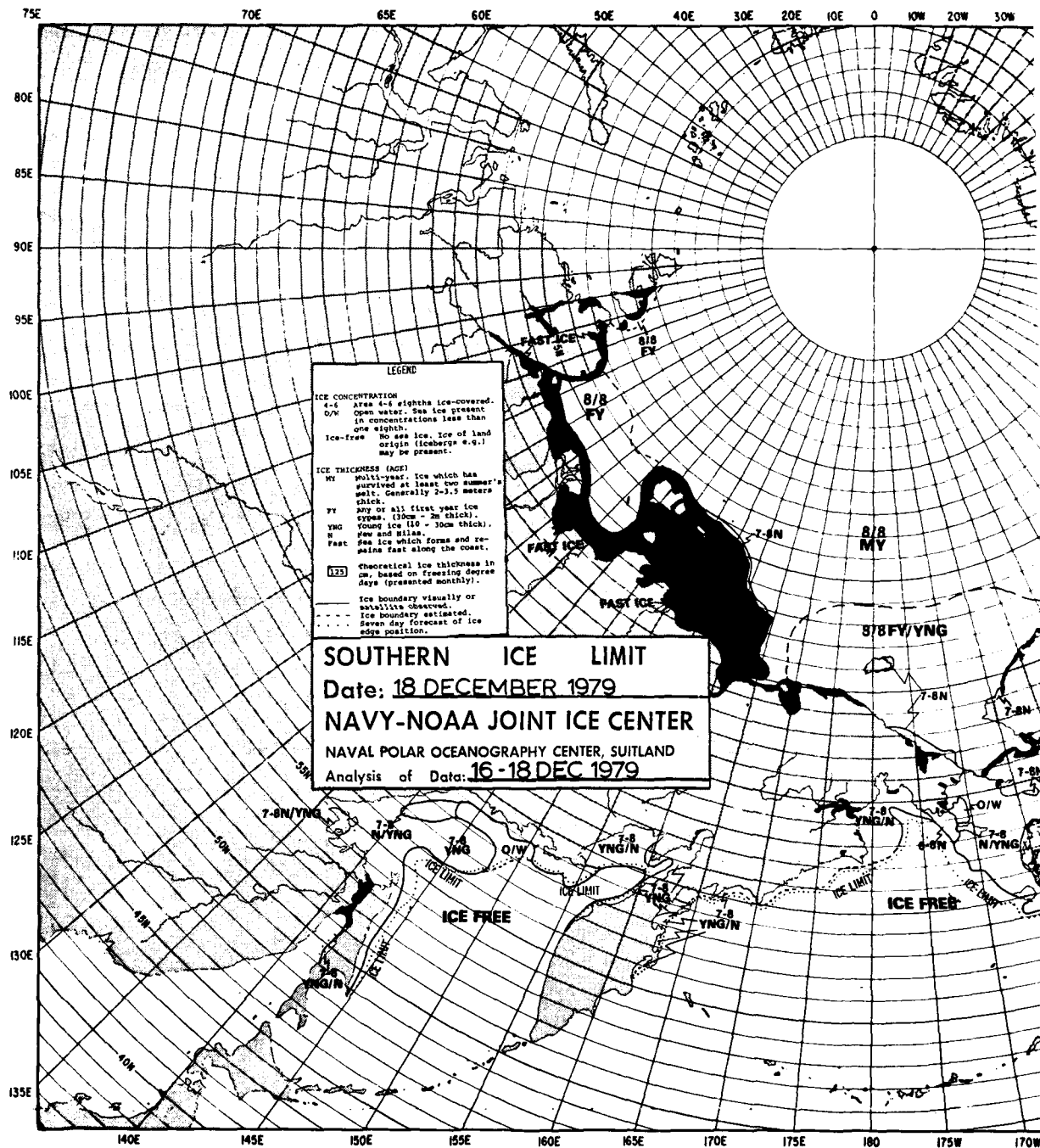


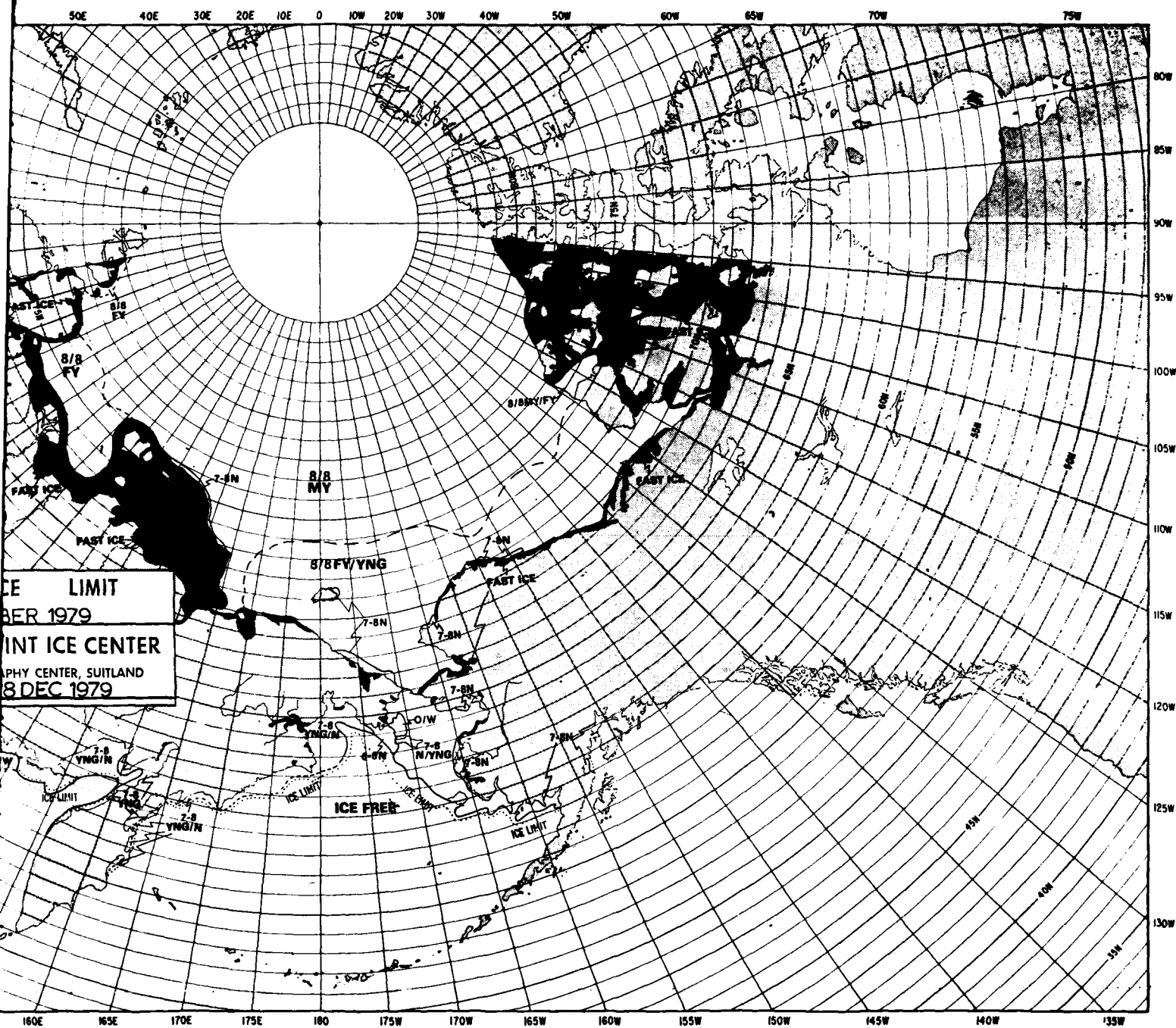


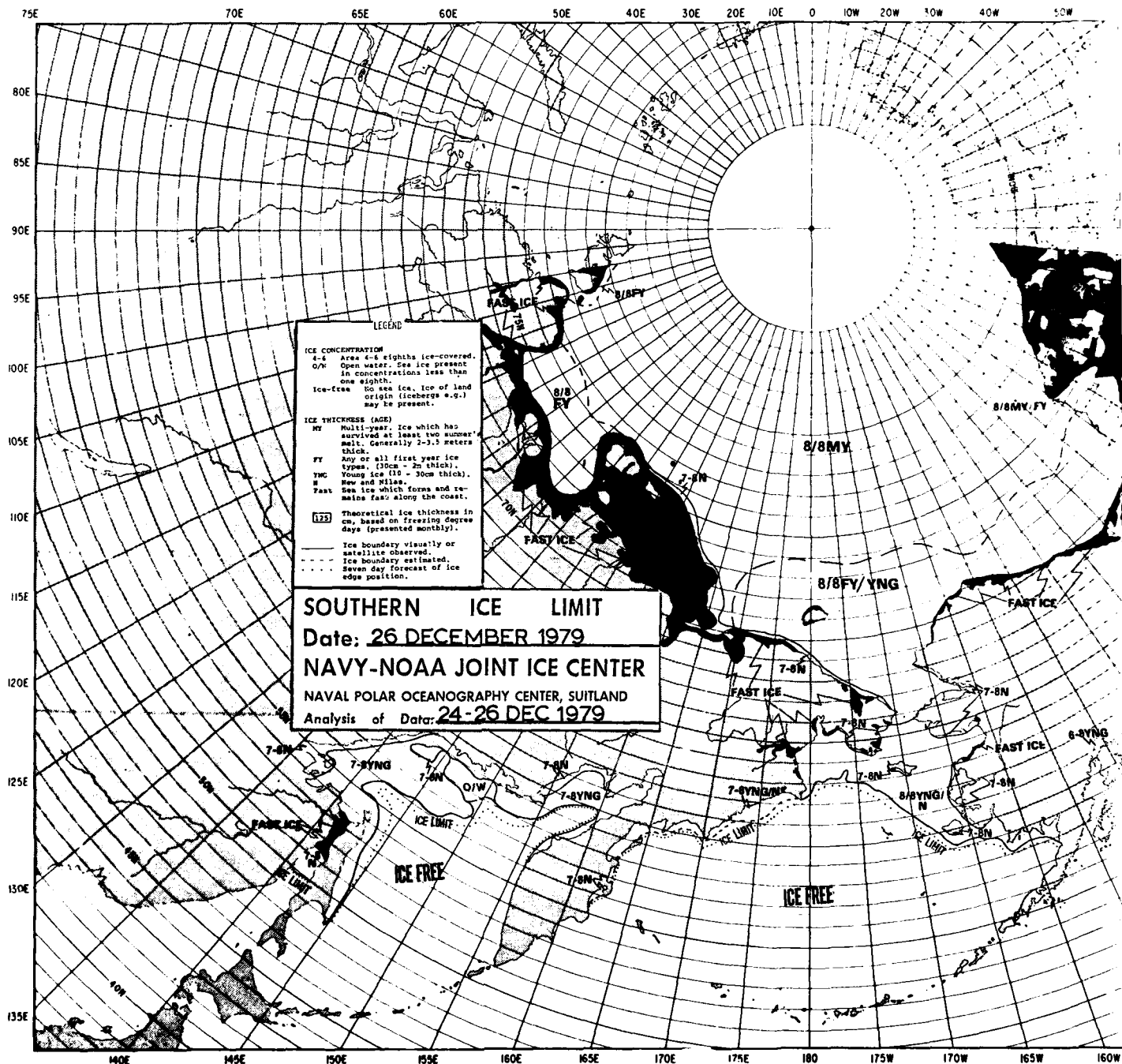


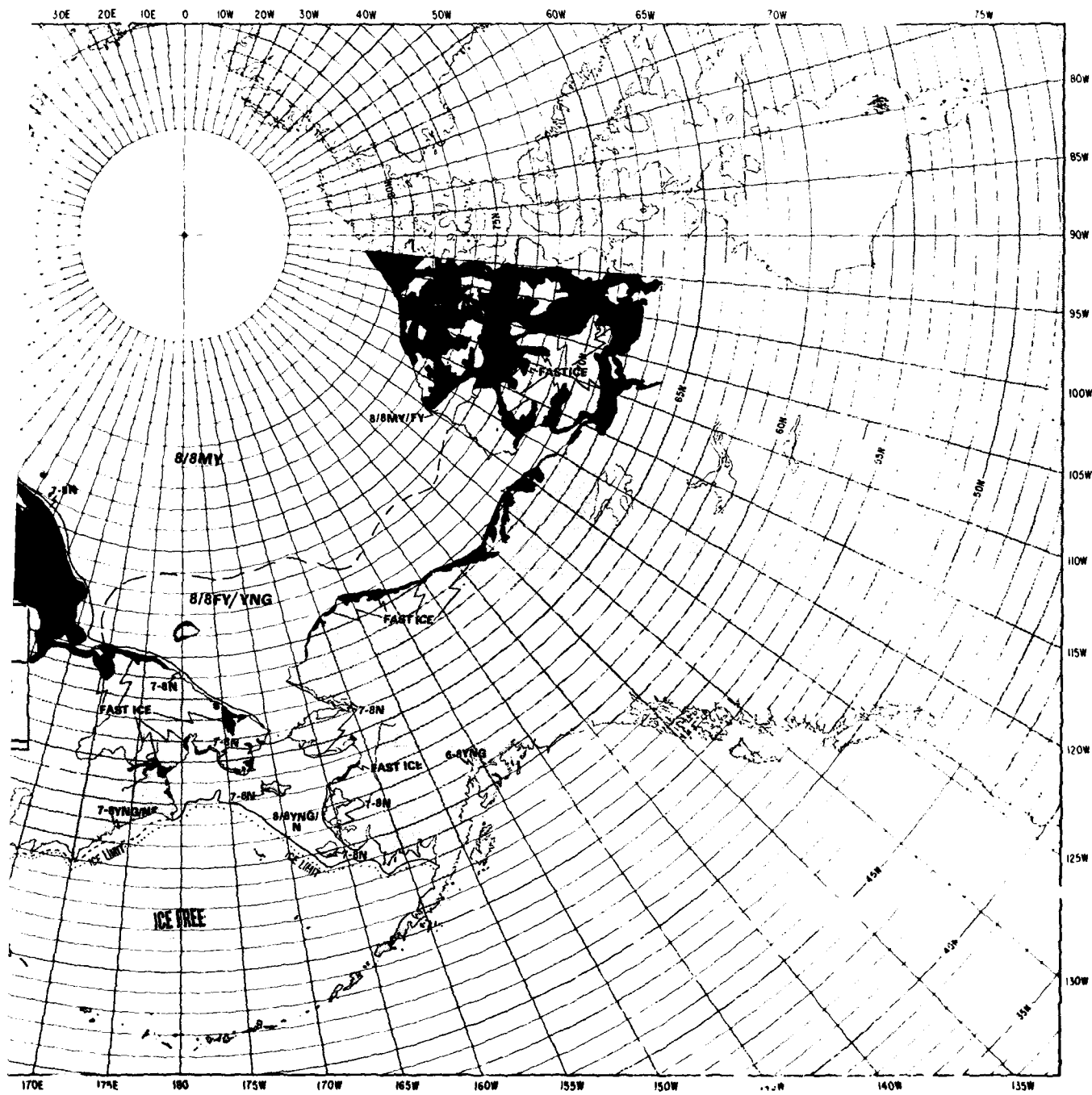












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TABLE I TYPE OF SATELLITE DATA UTILIZED DURING 1979

Time Period		Satellite Remote Sensing			Resolution (Subsatellite)
from	to	Sensor platform	Sensor type	Spectral region	
1-79	1-79	NOAA-5	VHRR VIS IR	0.6 - 0.7 um 10.5 -12.5 um	1 km 1 km
2-79	12-79	TIROS-N	AVHRR HRPT/LAC VIS IR	0.55 - 0.90 um 10.5 -11.5 um	1 km 1 km
			GAC VIS IR	0.55- 0.90 um 10.5 -11.5 um	4 km 4 km
1-79	12-79	DMSP	HR MI	0.4 - 1.1 um 8.0 -13.0 um	3.7 km 4.4 km
1-79	12-79	NIMBUS V	ESMR	1.55 cm	25 km
3-79	6-79	GEOS-3	ALT	13.9 GHz	7 km

Abbreviations and Acronyms

ALT	Radar Altimeter	IR	Infrared
AVHRR	Advanced Very High Resolution Radiometer	km	Kilometer
cm	Centimeter	LAC	Local Area Coverage
DMSP	Defense Meteorological Satellite Program	MI	High Resolution (Infr
ESMR	Electrically Scanning Microwave Radiometer	VHRR	Very High Resolution
GAC	Global Area Coverage	VIS	Visual
GHz	Gigahertz	um	Micrometer
HR	High Resolution (Visual Scanning Radiometer)		
HRPT	High Resolution Picture Transmission		

DATA UTILIZED DURING 1979

Satellite Remote Sensing			Resolution (Subsatellite point)	Coverage
Form	Sensor type	Spectral region		
5	VHRR VIS IR	0.6 - 0.7 um 10.5 -12.5 um	1 km 1 km	Regional
-N	AVHRR HRPT/LAC VIS IR	0.55 - 0.90 um 10.5 -11.5 um	1 km 1 km	Regional
	GAC VIS IR	0.55- 0.90 um 10.5 -11.5 um	4 km 4 km	Global
	HR MI	0.4 - 1.1 um 8.0 -13.0 um	3.7 km 4.4 km	Global
S V	ESMR	1.55 cm	25 km	Global
3	ALT	13.9 GHz	7 km	Regional

Resolution Radiometer

ical Satellite Program
ing Microwave Radiometer
ge

Visual Scanning Radiometer)
cture Transmission

IR Infrared
km Kilometer
LAC Local Area Coverage
MI High Resolution (Infrared Scanning Radiometer)
VHRR Very High Resolution Radiometer
VIS Visual
um Micrometer

2

ATE
LMED
-8